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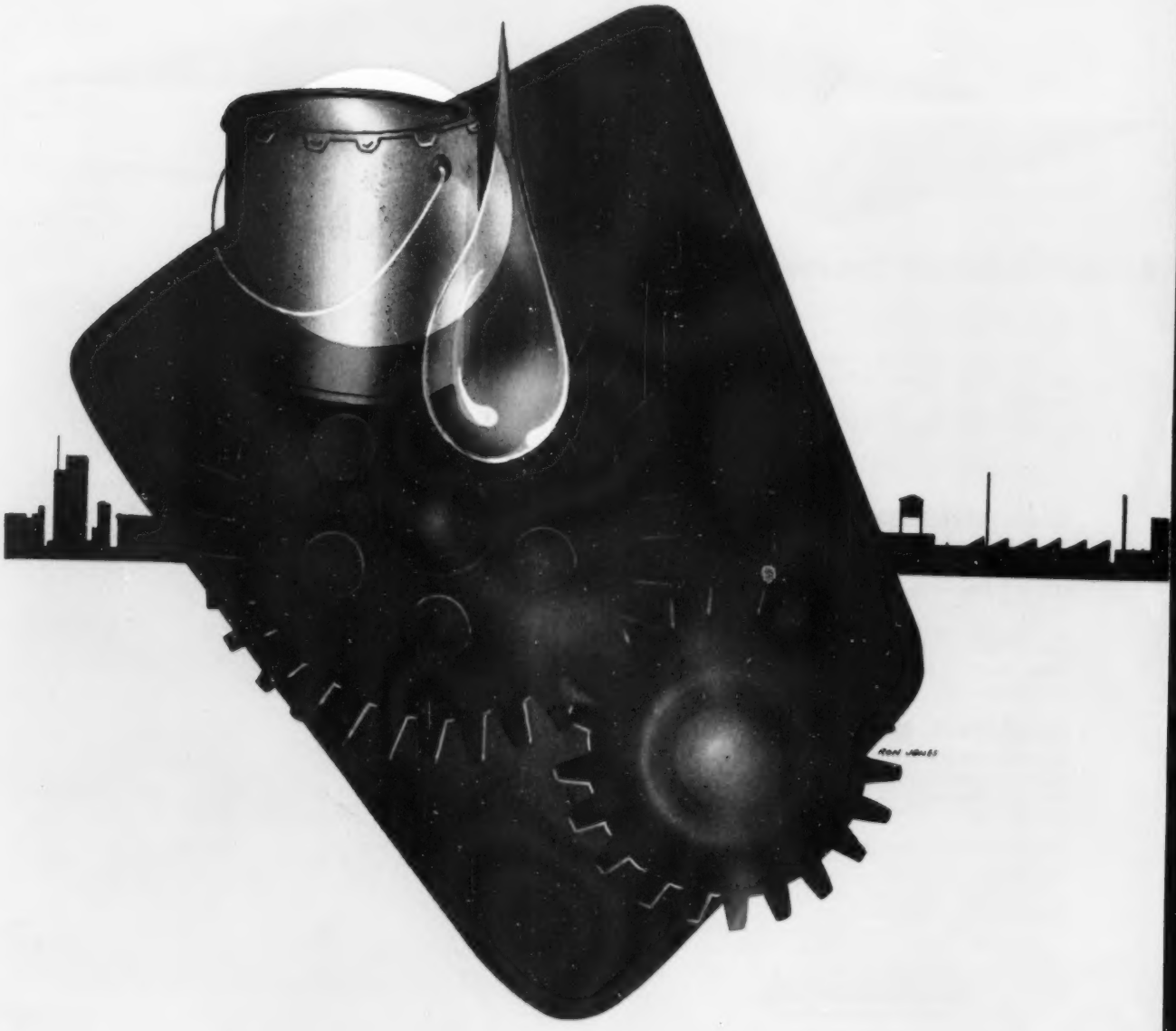
NLGI Spokesman

Journal of National Lubricating Grease Institute



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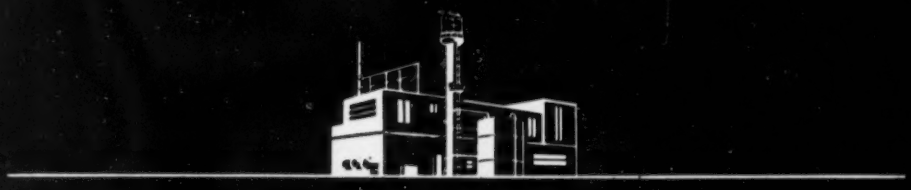


President's page

by G. A. OLSEN, President, N L G I

ARE YOU FREEDOM-CONSCIOUS?

The courage of conviction displayed by the fifty-six men who signed the Declaration of Independence should never be forgotten by anyone who is so fortunate as to live in our United States.

In commemorating the signing of that great document, we seldom pay proper tribute to the memory of those courageous men who, when they affixed their signatures to the Declaration of Independence, fully realized that such signing would also entail much personal suffering, sorrow, and financial hardship.

There were many in that day who thought it better to compromise and appease instead of squarely facing the issues of the day, just as today we have those among us who seem to think that when conviction with courage is the issue of the day, it should be supplanted by appeasement.

If we are to preserve the freedom which those noble patriots bought and paid for with their blood, sweat, and tears, it is incumbent that each one of us assumes and accepts his personal responsibility with courage and conviction in the days ahead and be ever watchful for those who would destroy us from within, as well as from the outside.

In this day of clever propaganda, it seems to the writer extremely important that we do not allow ourselves to accept as facts the new "Red Blueprint for 'Socializing' U.S.," which includes infiltration of our Political Parties, Labor Unions, Farm and Civic Organizations, and other groups, together with creating distrust in our National Policy, all of which is fully outlined in a reprint of Babson's Washington Forecast of Monday morning, June 21, which is being printed in full in this issue of the Spokesman. This is well worth your careful reading and study so that you personally may be equipped to combat this insidious poison as you may meet it from day to day.

As it is everyone's individual responsibility to zealously guard the freedom we now enjoy because of the convictions and courage of the fifty-six men and the people they represented when they signed the Declaration of Independence, we must be continually watchful of those who would innocently or maliciously assist in taking away the freedom we inherited, have guarded, and now enjoy.

Red Blueprint for "Socializing" U. S.

Reprinted from the June 21, 1954 issue of Babson's WASHINGTON FORECAST

The Communists have a plan for a bloodless revolution in the United States.

It was distributed recently in printed form to the party faithful...and to a large number of known sympathizers.

While we fit in neither of the above categories, we have secured a copy...and feel that it is vitally important to describe its contents fully to our clients.

Like most Commie literature, this draft program of the U. S. Communist Party is deceptively titled. It's called "The American Way to Jobs, Peace, Democracy."

With obvious tongue in cheek, the document is prefaced by the statement that the program is truly a draft...subject to frank and constructive criticism "in line with its (the Communist Party's) long-standing democratic practice and policy."

Carrying the same farce a step farther, comrades are advised that the program will be republished later (in September, we learn) in its final form...after having benefited by "the best collective thought."

It may be safely predicted that no Red underling will be so brazen...or so naive ...as to suggest a fundamental change.

Basis of Fear

The document bases its entire program on three grave calamities which it says are about to befall our nation.

Here are those "perils"—directly quoted from the Red program:

1. "The storm clouds of a major economic depression are nearly upon us."

2. "Our nation's foreign policy has led us into a blind alley."

3. "Our traditional liberties are vanishing, being replaced with the ugly menace of McCarthyism."

Unless these "perils" are eliminated, the nation's top Communists "fear" that the country is faced with "the disaster of economic ruin, fascism, and war."

The Looming Depression

The Commies contend the Eisenhower Administration is "of, by, and for big business."

To big business, they say, war is the only answer to the threat of economic crisis ...and war is used as "the instrument of fabulous profits."

Workers are being "exploited," they charge, and human needs are being sacrificed.

The Draft Program then suggests a detailed legislative program...but cautions that enactment of these measures will merely delay—not avert—the crash they predict.

As for eliminating economic crises, they say, "Only socialism can do that."

Here are the major proposals of the Communist Party, U.S.A.:

Defeat all wage-cut attempts, raise wages on all levels, shorten the work week (but not weekly earnings), curb speed-up, lower consumer prices, and "rent gouging," shift the tax burdens to the rich, provide federal guarantees against mortgage foreclosure and bankruptcy, give 100% price parity to small farmers, legislate guarantees of jobs and living standards, convert nuclear power plants to peaceful use, increase old-age and unemployment benefits, offer "free and equal" educational opportunities to youth, institute a federal health-insurance program, expand flood control, conservation, power-dam development and rural road building.

By way of analysis of the above proposals, clients should note that...while some,

in themselves, are reasonably supported by ardent anti-Communists...all the proposals dovetail into four traditional Communist objectives: (1) To appeal to selfishness among specialied groups; (2) to stamp out individual initiative and independence; (3) to engender class and racial dissension; (4) to force the U.S. to spend its way into a disastrous depression.

As always, Moscow has two sets of contradictory objectives...one stated and one actual.

The Danger of War

The Communist Draft Program accuses "Wall Street trusts and cartels" of "a conspiracy to dominate the world."

As a tool of that conspiracy, the Reds say, the capitalists have built up "the myth of Soviet aggression."

The document clearly outlines the program which must be pushed by Commies and fellow travelers to defeat "Wall Street's foreign policy."

U.S. Reds are ordered to work for: Acceptance of the principle of "peaceful coexistence," an end to the arms race and to "the U.S. policy of encircling the globe with military bases," a ban on the use of all atomic weapons (nothing is mentioned concerning inspection), a drastic reduction in all armaments, opposition to "militarization" of youth and Universal Military Training, and an end to "the policy of remilitarizing Germany and Japan."

Other objectives include: An extension of U.S. credit to bolster world trade (but a rejection of "fraudulent Point 4 programs which rob others of their natural resources and keep them as backward hinterlands"), hands off Guatemala, independence for Puerto Rico, and an end to the "Dulles policy of instigating civil wars and of aiding the oppressors of colonial peoples."

The ridiculous nature of the double standard which the Commies apply to the policies of Soviet Russia and the United States is best illustrated by this gem—quoted directly from the Red program.

They call for: "No intervention in the internal affairs of other nations and the recognition of the right of all nations to govern themselves."

The Menace of McCarthyism

The Commie Program views McCarthyism as a "grave danger to our democratic liberties."

Fully two-fifths of the entire document is devoted to excoriating the Wisconsin Senator.

McCarthyism is called "an expression of ruling-class fear of the re-emergence of the progressive majority in which the American Communists were a part and stimulating force."

This "evil" can be expelled, say the Reds, "only when progressive Americans, whether they like or dislike Communism, begin to realize that Communism is not the issue in this country today or in the near future." (Note the words—"in the near future.")

Again, the drafters of the Program tell the comrades just how this can be done.

Here's the Red program: Defend "the constitutional rights of all, including the Communists," end "witch hunting," abolish all "witch-hunting congressional committees," halt the "Gestapo-like political activities of the FBI," grant amnesty to Eugene Dennis, Benjamin Davis, Gus Hall, and "other Communist leaders and victims of McCarthyism," fight against the outlawing of the Communist Party and against depriving Communists of their citizenship rights."

Repeal the Smith and McCarran Acts, repeal Taft-Hartley, protect labor's right to organize and strike, ban strike-breaking injunctions by court order by government decree, and restore "academic freedom and freedom of inquiry" for America's youth.

The battle cry is sounded by this excerpt from the Communist Draft Program:

"To defeat this menace (McCarthyism), to safeguard the democratic rights and liberties of the American people, is the first task of the hour."

Political Action

Communist leadership lists the following groups as special targets for the comrades and fellow travelers to woo: Negroes, Mexicans, Puerto Ricans, Indians, wage workers, working farmers, small business and professional people, intellectuals, organized labor, women, and youth.

Regarding labor, the program says, "A major responsibility rests upon the organized labor movement. It must become the propelling force of a popular coalition movement which unites all of the above."

The document recognizes "signs of a hopeful new awakening in our land." It says that people are becoming alarmed over McCarthyism ...their opposition to the Eisenhower Administration is growing...they are "beginning to speak up for peace."

"The collision between these people and the foreign and domestic policies of McCarthyism," it says, "must grow in volume and intensity."

The Communist Program sets out two immediate political objectives: (1) Change the composition of Congress in 1954; and (2) elect a new Administration in 1956.

The first objective, according to the Red document, is to elect "an anti-McCarthy Congress by defeating every McCarthy-McCarran-Dixiecrat type of candidate" and to "bring into the halls of Congress a bloc of articulate and uncompromising opponents of McCarthyism, of courageous spokesmen for a

further relaxation of world tension and for the defense of the people from the ravages of economic depression."

The Program calls for stronger labor and Negro representation in the new Congress to "facilitate the election of a new Administration in 1956."

Third Party?

The Communist Program states that the time is not yet ripe for a third party.

The proper immediate course, it says, is infiltration into our two major parties... particularly the Democratic Party...by organized labor and allied groups.

But...the document points out that "labor must set its sights in the direction of a great party of its own" for "only in the course of sustained struggle along these lines will the perspective of a mass third party of the people, led by labor and its allies, materialize."

The following direct quotation from the same Draft Program of the Communist Party is of vital importance in understanding the domestic political aims of the Reds in America.

It says: "As the American people succeed in electing a new Administration and blocking the immediate menace of fascism and war, a new stage of the struggle will begin to unfold. It is then that the perspective of subsequently electing a new type of government, a farmer-labor government, will begin to arise in our country."

Summary of Purposes

Under the heading of Communist Aims and Perspectives, the Program states that "The Communist Party, basing itself on the scientific principles of Marxism-Leninism, believes in socialism as the ultimate solution for the problems of our nation."

In conclusion, the document states that the following "path to socialism in the United States" is envisioned:

1. "The unity of the majority of the people to block the present imminent threat of McCarthyism, thereby upholding and defending the Constitution and the Bill of Rights."

2. "And then, the forward march of that majority toward a strengthening of democracy and the election of a new type of government, a farmer-labor, anti-monopoly government."

3. "The election of such an Administration and Congress would then open up the possibility for a peaceful advance of the American people to socialism."

That—in a nutshell—is the plan of the Communist Party for political domination of the United States.

Not Simple Arithmetic

Because we feel that knowledge and understanding of the above objectives are vital to the American people, we have devoted the entire body of this Letter to direct quotation from the Draft Program of the Communist Party, U.S.A.

This is no "dope story"...no figment of an editor's fancy.

It is taken—word for word—from the authentic document, privately printed for the Communist Party by New Century Publishers, 832 Broadway, New York City.

From the opening paragraph to the last, it is obvious to the reader that these are orders — detailed instructions — from Red masterminds to the thousands of Communists and fellow travelers still operating in this country.

It is true that the number of Red workers in America has been greatly reduced in recent years...but their strength and influence cannot be judged in terms of mere numbers.

Each one has been sold a phony ideology and has become a zealot...willing to devote all of his time — even his life — to "the cause."

As a result, one Communist is worth more than 100 loyal Americans in effectiveness and influence.

It is a sad commentary on democracy that French governmental leaders feared to hold a national election during the summer...because the Reds would thereby have made political gains.

They openly admit that only the Communists take their politics more seriously than their vacations.

Time for Turnabout

The intellectual Communist has become conscientiously convinced that his party really stands for peace and for the uplifting of the masses.

He has one impenetrable blind spot which does not allow him to see that the Red battle for "peace" is a move to make America weak and therefore vulnerable; that the Communist Party is not truly interested in a sound economy for this country but rather is attempting to infect us with the germs of depression.

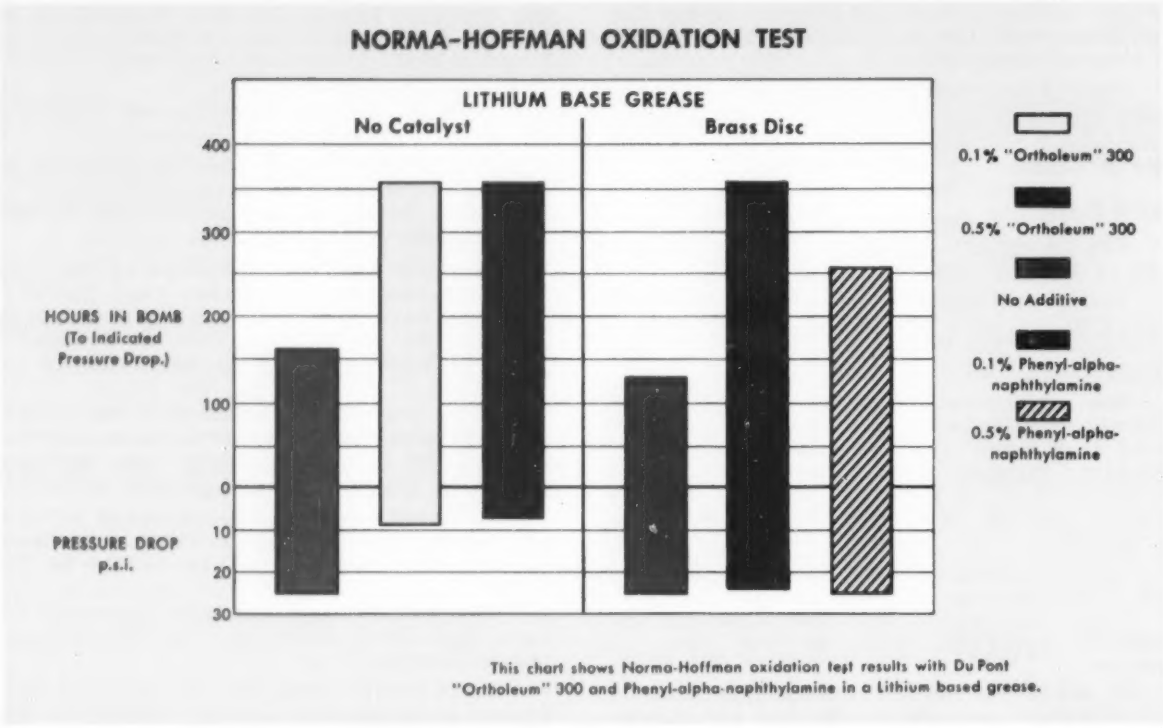
Every Communist has been told that the hour to strike in America will be at the depths of the next depression...yet many of them really believe that the "reforms" suggested by their leaders are economically sound.

To combat this false ideology, all of us in America must sell ourselves and our children a better ideology...one that will make all of us zealots for good.

That ideology must be based on inviolable moral principles...honesty, unselfishness, and love of neighbor.

Historically, evil has always been eventually defeated by good.

With sincere moral purpose — and with God's help—it can be done again.



This chart shows Norma-Hoffman oxidation test results with Du Pont "Ortholeum" 300 and Phenyl-alpha-naphthylamine in a Lithium based grease.

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Both of these Du Pont antioxidants also provide a low cost way to make your greases more valuable and attractive to the customer . . . and insure customer satisfaction and repeat business, too. So it will pay to try them out in your stocks. Write us today for free samples and more information.

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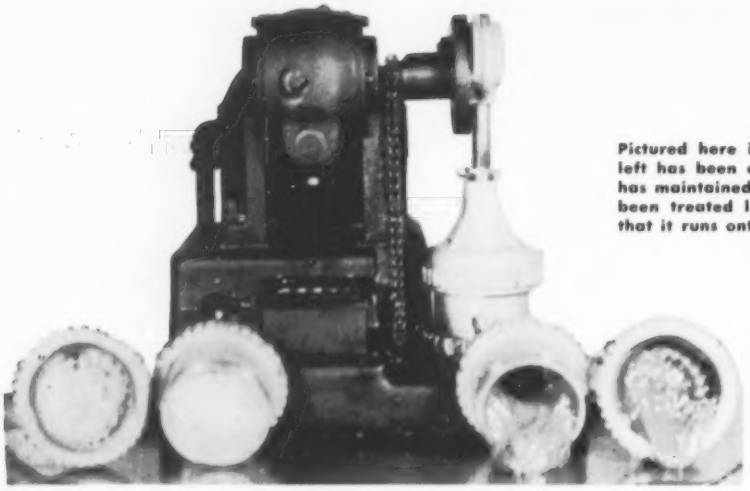
IN THIS ISSUE

ABOUT THE COVER

"You want me to illustrate The Performance and Testing of Lubricating Greases Under Wet Operating Conditions?" Our artist looked confused. "What do you want on the cover, a submarine?"

We read choice parts of our article on page 12 to him, timidly suggesting he might use tanks, gears, trucks and "stuff like that" sloshing around in a lot of water. Here's the illustration he drew and we think it's rather good. You're right. That is a drop of water coming down on those gears.



Pictured here is the assembled tester. The cup on the left has been churned 100,000 strokes with water and has maintained its consistency. The cup on the right has been treated likewise but has liquefied to the extent that it runs onto the table.

by H. L. Hendricks

and J. D. Smith

International Lubricant Corporation

Performance and Testing of Lubricating Grease Under Wet Operating Conditions

Introduction

If all greases compounded by the manufacturer could operate under ideal conditions in the field, his problems would be vastly alleviated. At the same time the problems of the consumer, the lubrication engineer, and various others along the distribution and application line would be simplified. However, this is not realized in practice and all concerned have to operate under the assumption that greases in the field will be required to perform their job under a wide range of non-ideal conditions involving extremes of temperature, contamination, overloading, misapplication, and faulty machine design.

Everyone is, of course, aware that the primary function of a grease is to lubricate; i.e., reduce friction between two surfaces that are in contact and are moving relative to each other. And the important differentiating feature of greases when compared with fluid or Newtonian lubricants is the fact that they do have a body or consistency to an extent that they will "stay put" and so are particularly advantageous for many applications where fluid lubricants are not. This ability of a grease to "stay put" is an axiomatic requirement if it is to lubricate the surfaces on which it is applied. There are also other qualifications which may be desired and may even be considered essential—such as mechanical stability, oxidation stability, and ability to prevent corrosion or rusting of the metal surfaces.

In recent years a considerable amount of research and development work has been done on greases. The high and low temperature properties of greases have been studied and improved, as well as numerous other properties, and under a wide variety of operating conditions. However, it seems that the ability of greases to lubricate and also to prevent corrosion of metal surfaces when they are used under wet operating conditions has not received its necessary share of attention. In many operations in automotive, industrial and marine applications water contamination is a major problem.

It is this problem that we are concerned with in this paper.

Many examples could be cited of field experiences with water contaminated greases, which allow one or more things to happen. The grease liquefies and runs out of the bearing. It may harden and fail to lubricate. If sufficient water is absorbed into the grease, the en-

tire mixture may freeze when subjected to low temperatures. If the grease does not absorb water, the free water may corrode the bearing surfaces. Still another effect is the failure of the grease to adhere to metal surfaces in the presence of water.

These problems are accentuated in military service. A recent report from the military on field performance of greases indicates that great importance is being attached to obtaining greases for superior performance under wet operating conditions. Actual use in the field apparently brought out the need for specifications covering this shortcoming, and recent amendments to grease specifications are taking this into account.

In industrial uses many examples of wet operating conditions could be given. Steel rolling mills, cannery equipment, chemical processing plant equipment, water pumps in general, as well as many others—all involve machinery operating under wet conditions. Even when seals are employed they are seldom perfect and water contamination will occur.

Behavior of Conventional Greases in the Presence of Water

Let us review briefly the observed behavior of the more common soap base greases when they contact and intermingle with water.

The regular water stabilized calcium base greases, (not to be confused with the new anhydrous types), such as the conventional cup greases, apparently have very good water toleration properties. They will absorb considerable water without losing their consistency and mechanical stability and have reasonably good metal wetting and corrosion protective properties when this water has been absorbed. Unfortunately, for today's normal grease requirements their limited temperature range prevents their use for general purpose grease lubrication.

In achieving higher temperature operating ranges by the use of sodium base greases, we find that in using a water soluble soap we get a water soluble grease. Thus, in uses where water may be encountered they must normally be excluded, as they are readily dissolved and lose their consistency or are washed out of the bearing.

Aluminum soap greases have good water toleration characteristics and, like calcium greases, they have good metal wetting properties under wet conditions. However, due to their poor mechanical stability and their narrow temperature range they have somewhat limited use as general purpose greases.

Barium soap greases on the other hand are water insoluble and have a higher operating temperature range. Certain types appear to have very good water toleration properties. However, the authors' experience is limited on the evaluation of the overall behavior of these greases in the presence of water.

Lithium greases may be divided into two categories in their response to water contamination. Lithium stearate types are very water insoluble and do not absorb much water into their structures. This may be desirable under certain specific operating conditions but not in general applications. If free water remains in a water contaminated bearing the chance of eventual corrosion is greater than if the water is absorbed into the grease as a stable emulsion.

The second general lithium type is the lithium hydroxy stearate greases. In their water absorption characteristics and metal wetting properties they are different from lithium stearate greases in their capacity to absorb considerably more water before they are saturated.

The authors have not examined many of the inorganic gel thickened greases in their reaction to water. However, of those examined, another important property was noted. The corrosivity of the straight greases without corrosion inhibitors or added water was considerably greater than soap base greases. However, effective inhibitors have been found which alleviate this deficiency and an inorganic gel thickened grease having excellent corrosion protection can be formulated.

On reviewing the observed behavior of the various soap and inorganic gel greases, it is apparent that few of the straight greases give entirely satisfactory performance that will insure both proper lubrication and adequate metal corrosion protection when water is likely to be the contaminant in significant quantities. This problem is certainly one of major interest and all signs point to the necessity of improving the performance of greases under wet operating conditions. In improving this quality it is, of course, important that the other desirable properties of the greases not be adversely affected. It has been our aim to combine the study of this problem with a continual evaluation of the other desirable properties of the lubricant in order to insure a well balanced product. To do this we have used various available tests, and have devised others in our laboratories when the available tests apparently did not adequately measure all the properties which were desired.

This picture shows the authors, H. L. Hendricks on the left and J. D. Smith on the right, in a significant examination of a test specimen from the Wet Oscillating Friction machine and an actual corroded king pin from a large bus. The purpose is to note similarities in the type of corrosion found.

Test Methods

There are a number of tests and observations which one may apply to gain information regarding what happens to a grease and to its ability to lubricate and prevent corrosion when water is introduced as a contaminant.

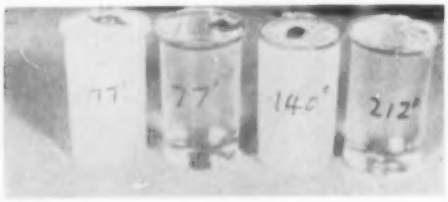
The simplest screening test, but one which tells considerable about the test grease, is simply a visual observation of the behavior of the sample to hot and cold water contamination. If one takes a small amount of grease—in his palm or on some smooth surface—and by using his finger or a spatula works increasing amounts of water into it, he will be able to observe several things. First, does the grease absorb water, and secondly, if so, does the grease in retaining the water become fluid or does it maintain its consistency? Certainly if a small amount of water liquefies a grease, it is not a good risk if water contamination is a possibility. If the grease does absorb a reasonable amount of water and retains its consistency, does it continue to adhere to metal surfaces or does it allow the water to preferentially wet the metal surface. If the grease loses its metal affinity, it is readily worked out of the bearing leaving the surfaces dry of lubricant and allowing the exposed metal to be corroded.

If hot water is involved or if a bearing runs hot and water contamination may be involved, a very simple test may be made. A small lump of grease—about the size of a marble—may be floated in a beaker or other container of water. The water in turn is heated to boiling and the temperature noted at which the grease disintegrates, or if it does not disintegrate and if it remains visually unaffected by boiling water.

Among the well established military tests on the behavior of greases in the presence of water is the water absorption test included in the AN-G-3a Specification. The ability of greases to absorb water to a point where they become completely fluid or where no further water will be absorbed varies widely, and this property has been reduced to a quantitative value by means of this test. Simply summarized, a specified amount of grease is used in a standard size and shape container into which exact increments of water are added while the grease is being stirred by a specified mixer turning at a fixed speed. A given grease absorbs water to a point where free water exists and may be observed to remain free, or the mixture becomes fluid. At this point a calculation is made as to the per cent water which the sample has absorbed.

However, the test should involve one more consideration. What is the condition of the sample and its lubricating properties at the point of maximum water absorption. Certainly one grease which absorbs 40% water and remains a consistent mechanically stable lubricant must be rated above one which in absorbing 40% water disintegrates and becomes fluid.

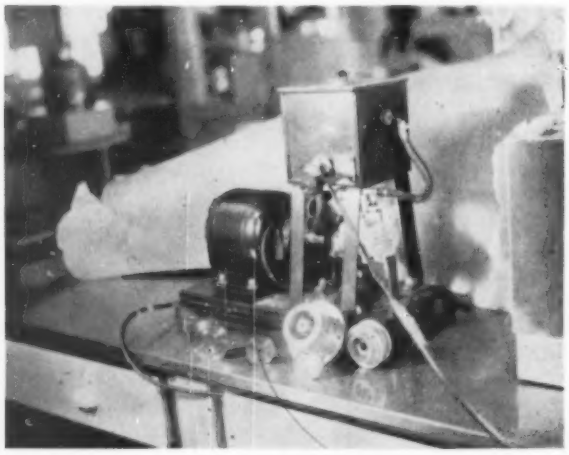
Another well established Military Specification which has been used in a number of laboratories is the AN-G-5a Water Test. This is a simulated service test and involves turning a ball bearing at a given speed, in a housing with a prescribed annular opening, impinging a jet of water at a controlled temperature against the housing, and attempting to wash out the grease through a bottom outlet. The per cent washed out during a given time is reported. This test is considered by many to



The picture at the left denotes the behavior of grease in contact with water and from the beaker on the left labeled 77°, from left to right, shows a typical soda base grease in water at room temperature, an improved soda base grease with some water resistance in water at room temperature, the same grease with the water warmed to 140°F, and an improved lithium grease which has been boiled.

Shown in picture at bottom left is the apparatus used to determine the amount of water that a given grease absorbs under a stated set of conditions. It shows these results: water has been absorbed and the grease remains stable; water has been absorbed and the grease has completely liquefied; very little has been absorbed and free water co-exists with the grease.

At bottom right is a view of the tester with the test unit disassembled.



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be appropriate for wide use and ASTM D-2 has recently voted to adopt a variation of it as a tentative standard following the work of Section III Technical Committee G fixing test conditions and determining repeatability and reproducibility.

Another Military Specification test which has been used for some time for determining the performance of greases in the presence of water is the Salt Spray test. This test (Federal Specification TT-P-141 Method 606) evaluates the ability of a grease in a thin film to prevent the corrosion of a specified grade of steel in the presence of aqueous fog, which usually is synthetic sea water but is adaptable to any test solution.

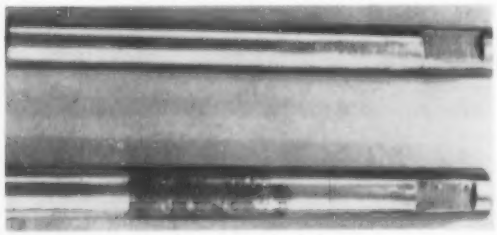
A new test which has recently been incorporated in military specifications in an endeavor to obtain greases of better quality with respect to performance in the presence of water is included in Amendment 2 of MIL-G-10924. It is a test for determining the mechanical stability of greases in the presence of water. It has become rather widely used in the last few months and involves adding water to the grease to be tested until a 10% water concentration is obtained. It is then worked in the ASTM mechanical worker for 100,000 strokes. A qualified product must not break down in consistency more than 75 decimillimeters penetration. This test, of course, could not be passed by a grease that loses its consistency by mere admixture with small percentages of water. And a grease must further have good mechanical stability in the presence of water in order to qualify. This test as specified in Amendment 2 involves a single water concentration. However, a more comprehensive evaluation could be obtained by running a series of tests with different water percentages.

Another test, commonly known as the Glass Jar Corrosion test, which various laboratories and test panel groups have investigated, combines a measure of both water resistance and corrosion protection. This test consists of lubricating a roller bearing with the test grease, running the bearing at a moderate speed and load for several minutes, then, without disassembling the bearing, it is placed in a covered glass jar and partly immersed in a standard test water—which may be tap water, distilled water, or distilled water containing exact amounts of salts such as NaCl. After being allowed to stand for a prescribed length of time, the bearing is removed and several observations made.

1. Is the test water clear or rusty?
2. Has the grease been dissolved from the submerged portion of the bearing? From the upper portion?
3. Are the bearing surfaces corroded?

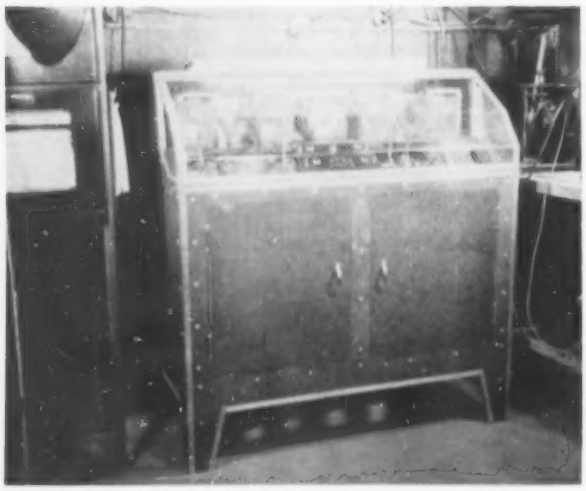
While this is a static test it does simulate actual field conditions of parked vehicles and idle machines. It is of particular value in working with corrosion inhibitors.

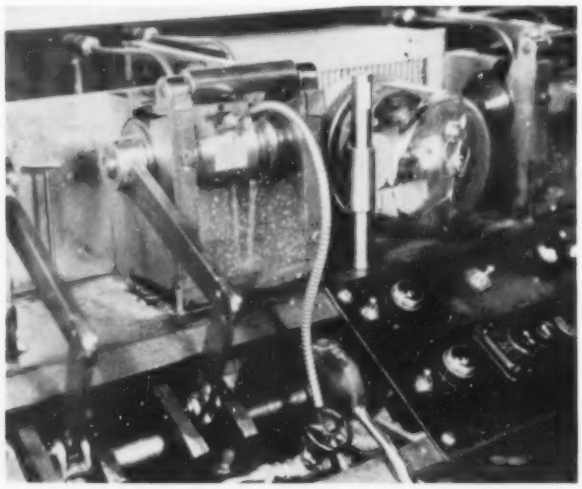
Another static corrosion test developed by associates of the authors is similar to the above test except the water is mixed into the grease before it is applied to the test bearing. After it is applied to the bearing a load of 500 to 1000 lbs. is applied and the bearing is rotated at 100 rpm for one minute. Then the bearing is stored for 120 hours with the load continually maintained. At the end of this period the raceways and rolls are examined for evidence of what may be called static pres-



Shown in the picture at left are two Wet Oscillating Friction Machine test journals. They have each been run the same length of time on the Wet O.F.M. The clean journal involves a grease which contains adequate corrosion inhibitors. The other journal is that same grease without the corrosion inhibitors.

At bottom left is the Wet Oscillating Friction Machine. Bottom right is a close-up of part of the Wet Oscillating Friction Machine. The details of one of four test units are shown.





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Metasap Research proudly announces Metasap® 615, an aluminum stearate grease base which offers marked superiorities in performance to any aluminum stearate base heretofore known. It's no longer necessary to pay more to obtain a grease base which equals the performance of Metasap 615. Other properties in which Metasap 615 excels:

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Compare this with the figure of about 265 for the average base, and a low of 235 with bases offered *only* for their high gel strength.

Metasap 615 produces grease which thickens very little during compounding

Again in contrast with other aluminum stearate bases, Metasap 615 eliminates the great increase in viscosity heretofore considered unavoidable during compounding. You can use lighter mixing equipment, less power—and no longer worry about broken paddles.

Metasap 615 has great worked stability—greases worked at 5,000 to 10,000 strokes show almost no change in consistency

Metasap 615 does not lose body on continued working, unlike many bases where excessive working adversely affects the body or consistency of the grease.

With Metasap 615 there is virtually no bleed, even with low viscosity oils

. . . whereas ordinary aluminum soaps have a decided tendency towards oil separation, especially with low viscosity oils.

Seeing is believing. As you see, we make strong claims for this new aluminum stearate. Once you have tried it in your own greases, under your own conditions, we believe you'll be as enthusiastic as we are. Write today for testing samples.

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Among the tests which the authors have developed and used in their own laboratory is a modified CRC Wheel Bearing Test in which the grease sample is pre-blended with a given amount of water—usually either 10% or 20%—and the resulting blend run on the standard wheel bearing tester for six hours at the equivalent 40 miles per hour rate and at 180°F. so that the added water does not boil off. Many greases, which give excellent results when tested without water, deteriorate under these conditions. This test is believed by the authors to be a "must" for automotive wheel bearing and multi-purpose greases. It does simulate service conditions. We know that water does get into bearings and that wheel bearings under certain conditions become as hot as 180°F.

The individual tests which have been discussed to this point are, in general, of value for determining one or perhaps two particular properties of greases such as solubility in water, static corrosion protective properties, or mechanical stability in the presence of water. It is apparent that most of these properties are interdependent to a large degree, and therefore evaluations of each quality individually is liable to give misleading data as to the probable overall performance of the lubricant where water is the contaminant. A more likely prediction of the performance of the greases in service can be obtained by a simulated performance test that is sensitive to the performance value of the major individual properties.

Since automotive chassis lubrication is one of the larger specific uses for greases and water contamination is an important factor in this application, a test designed to simulate these units and their condition of operation has been extensively employed in this investigation.

This test equipment is a modification of a unit developed by the authors which was the subject of a paper given in the "Institute Spokesman" for January 1951, and involves the testing of lubricants in a loaded journal bearing that is run under oscillating motion. The newer unit is an alteration of the first machine in such a manner that the test bearings may be operated with jets of water directed against each end of the bearing. The water is run on and off in two hour cycles since lubricant failure is indicated by a marked temperature rise of the bearing and when the water is running there is enough to cool the bearings and prevent the increase in temperature.

This picture shows the authors examining test bearings from a series of Glass Jar Corrosion tests. Notation is made of the extent and type of corrosion. The corroded areas may be examined microscopically and an over-all rating is then assessed.

These testers have been of great value in showing the difference in the performance qualities of various lubricants under dry and wet operating conditions and in evaluating the probable service performance of various experimental grease formulations and additives.

Several examples of the results obtained on tests on these units which show the difference that can be expected in the performance of various type greases under wet and under dry operating conditions are given in Table No. I.

Table No. 1

TEST RESULTS OBTAINED ON THE OSCILLATING FRICTION MACHINE UNDER WET AND DRY CONDITIONS ON VARIOUS TYPE GREASES

GREASES	TESTS	
	Wet O.F.M.	*Dry O.F.M.*
A (Water soluble soap)	retention-poor corrosion-slight hours-88	retention-good corrosion-slight hours-130
B (Water insoluble soap)	retention-fair corrosion-considerable hours-63	retention-excellent corrosion-slight hours-360
B + additive	retention-good corrosion-slight hours-288	retention-good corrosion-slight hours-320
C (H_2O insoluble soap)	retention-good corrosion-moderate hours-156	retention-good corrosion-slight hours-244
D (inorganic base)	retention-poor corrosion-severe hours-36	retention-good corrosion-slight hours-340

Two separate factors of particular interest in this study may be observed on this test other than the length of time satisfactory lubrication is maintained. The retentive property of the grease can be approximated by the quantity left in the bearings at the end of the run. Its ability to prevent corrosion can be estimated by the general appearance of the bearing journal.

These separate factors are considered and given a visual rating on this test merely as an aid in determining the cause of the lubricant failure. The overall evaluation of the quality of the lubricant is determined by the length of time that it will effectively lubricate, thus preventing an excessive rise in the temperatures of the bearing.

From the foregoing it appears to us that no one simple test is available, or likely to be available, to accurately predict the performance of grease under wet operating conditions, but rather a number of varied tests must be employed to obtain a likely prediction of the capabilities of the grease under field conditions.

The Essential Qualities Required of a Grease for Satisfactory Performance Under Wet Operating Conditions

Having reviewed the various water tests and some results obtained on different greases and in order to better evaluate the tests relative to the performance of greases, let us now attempt to discuss the desired requirements of a satisfactory grease for wet operating conditions. First we should restate the obvious prime requisite of a good grease. It must have the ability to "stay put" under static and dynamic conditions in the presence of water, and, in "staying put," corrosion must be prevented and adequate lubrication must be insured.

Water soluble soap base greases, such as most sodium base greases, may prevent corrosion so long as they "stay put." However, if a relatively small quantity of water is present they are readily liquefied and are lost from the bearing. Larger quantities completely wash the grease from the bearing leaving the bearing surface unlubricated and possibly damaging the brake linings in the case of automotive equipment. Thus we must conclude that a superior grease should not be too water soluble.

Some greases may be prepared which are very insoluble in water. Such greases at first glance would appear to be excellent products. However, if one looks a bit closer at an application of such a grease under wet conditions he would see that if the free water is not absorbed by the grease structure into an emulsion, corrosion of the metal surfaces that normally occur under humid conditions may take place, depending on whether the grease prevents the water from preferentially wetting the metal surfaces. In other words, perhaps a good grease should act as a "sponge" and absorb some water to prevent corrosion. However, if we insure that it will absorb some water, we introduce an additional problem—a stable grease structure must be able to "tolerate" its water absorption without losing its desired consistency.

From this point several other factors become apparent. Even if the grease does not lose its consistency with the addition of small quantities of water, we must fix some limit of water absorption or the grease will become too soft and unstable by the process of mass dilution alone. At the same time we must also be sure that it does not suffer a lessening in other key properties on absorbing reasonable amounts of water. These include, beside the mechanical stability previously mentioned, corrosion protection and lubricating ability. Some greases appear to absorb water in such a manner that a film of water surrounds the grease mass so that the grease actually will not adhere to or "wet" the bearing surface, i.e. lose its metal affinity. Obviously, this is an undesirable effect, since it will then allow the water to preferentially wet the metal surface with subsequent corrosion, and also allow the grease to be readily squeezed out of the bearing leaving it unlubricated. This is particularly undesirable if it comes when only small amounts of water have been absorbed. Fortunately, most of these characteristics can be controlled by proper formulation and processing of the greases. Let us now examine some of the aspects of this control.

Compounding Greases for Superior Performance Under Wet Operating Conditions

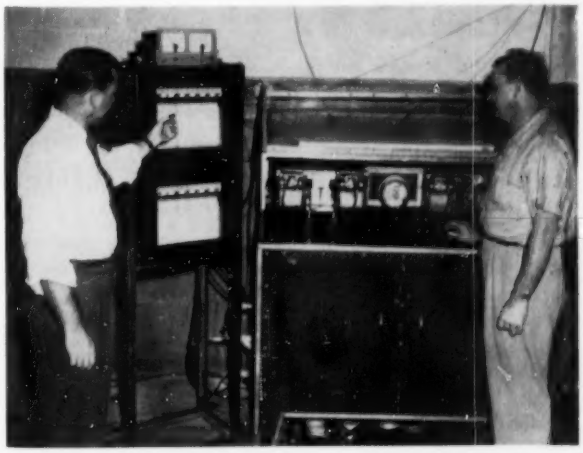
First we must select the metallic base for the soap that will combine with the proper fatty acid to give a thickening agent for the oil that is satisfactory as a multi-purpose product, and one that will respond to the use of various additives for enhancing their performance in the presence of water.

The water soluble greases are eliminated from the beginning since, as discussed earlier, they do not have the ability of "staying put."

There are various metal soaps used in grease making that are water insoluble and impart this characteristic in varying degrees to greases containing them. Among these are Aluminum, Barium, Calcium, Lithium, and Strontium. On the basis of present knowledge of these greases all are extensively used, and all but Aluminum are potential bases for multi-purpose greases. The straight greases compounded from these soaps vary over a wide range in their resistance to water contamination and breakdown and corrosion effects which may follow.

The search for and incorporation of these various additives into the greases to give the required degree of protection becomes a major problem of both formulation and processing.

Since the factors that are of particular concern relative to the processing of a grease containing additives to give the lubricant superior performance in the presence of water can be stated quite simply, let us review them briefly. The additives must, of course, be readily incorporated into the grease in a homogeneous mixture or solution, whichever the case may be. It is



Author Hendricks and the operator of the Wet Oscillating Friction Machine are shown here reviewing the recorded temperatures of the four test units.

necessary that this be accomplished in such a way that excessive equipment is not required or a radical change in the cooking process.

On the formulation side, the biggest problem to overcome is to find additives that will give the required degree of protection without adversely affecting other desirable properties.

Table No. II

TYPICAL TEST DATA OF VARIOUS GREASE FORMULATIONS UNDER WATER CONTAMINATED CONDITIONS

GREASES	TESTS	
	Glass Jar Corrosion	*Wet Oscillating Friction Machine*
A (water soluble)	water-cloudy grease-emulsified corrosion-considerable	retention-poor corrosion-slight hours-88
B (water insoluble)	water-clear grease-unaffected corrosion-considerable	retention-fair corrosion-considerable hours-63
B + inorganic salt	water-clear grease-unaffected corrosion-none	retention-fair corrosion-slight hours-75
B + metallo-organic	water-clear grease-unaffected corrosion-slight	retention-fair corrosion-slight hours-168
B + organic polar	water-clear grease-unaffected corrosion-slight	retention-fair corrosion-slight hours-165
C (water insoluble)	water-clear grease-unaffected corrosion-moderate	retention-good corrosion-moderate hours-156
C + additive	water-clear grease-slight emul. corrosion-none	retention-fair corrosion-moderate hours-242

The structure of lubricating greases is indeed complex as has been shown many times by papers before this group. This structure is comparatively susceptible to breakdown by the influence of additives particularly of the types that may exert a profound enough influence to insure adequate lubrication and inhibit corrosion in the presence of water. As an example, certain organo-metallic compounds commonly used in specialty grease formulations—such as lead oleate, sodium sulfonates, sodium naphthenates—will reduce the dropping point and mechanical stability of many greases if incorporated in sufficient amounts to modify the "staying put" and corrosion protection properties. Many additives are available at a reasonable cost which greatly improve these properties of greases if one ignores other effects. Actually, this cannot be done since mechanical stability and other performance factors cannot be sacrificed for corrosion protection. It follows that formulation work must be directed toward effective additives which do not have deleterious effects on desirable properties.

While it is not the intent of this paper to discuss specific additives, several general types that the authors have found to be quite effective may be mentioned and briefly discussed in order to show the variations in performance that can be obtained.

1. Dispersed inorganic salts,
2. Metallo-organic compounds of limited solubility in the grease, and
3. Purely organic polar type compounds.

Many of each of these types have been investigated by the authors. No attempt will be made to give the results obtained on these on all the tests which have been discussed, but rather a few examples will be given on two tests which the authors consider to be the most indicative of the probable overall performance which may be expected of the lubricants in service.

It may be briefly noted that the water soluble grease (grease A) emulsified and allowed considerable corrosion on the Glass Jar Test and showed poor performance on the wet O.F.M. The water insoluble grease (grease B), while not emulsifying, did allow considerable corrosion on the Glass Jar Test and was quite poor on the wet O.F.M.

The use of an inorganic salt in grease B prevented corrosion on the Glass Jar Test and gave a slight improvement on the wet O.F.M.

The same grease with either metallo-organic or straight polar organic additives improved the Glass Jar Corrosion Test results, and at the same time gave a considerable improvement on the wet O.F.M. performance.

Grease C is a further example of the marked improvement that can be obtained on the probable performance of a grease under wet operating conditions when the proper additives are used.

Summary

To summarize our study of the performance and testing of greases under wet operating conditions we may say that—

1. A problem does exist.
2. This problem involves both effects on the grease and effects on the bearing.
3. Available tests along with suggested additional tests can be utilized to evaluate effectively the factors relative to this problem.
4. Greases can be made to combat this problem by a judicious combination of grease thickener, proper processing, and appropriate modifying additives.

We have not attempted to try to answer all the questions involved nor have we attempted to offer specific recommendations. Rather we have attempted to delineate the problem and to offer some general ideas on possible solutions. We hope that others will elaborate on the problem and that eventually the military and industry will be offered greatly improved greases which will lengthen the normal operating life of existing and new machines and at the same time reduce their operating costs.

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Fatty Acids Produce Higher Grease Yields ☆☆☆☆☆ Increase Your Equipment Efficiency ☆☆☆☆☆ Raise Output Per Man-Hour

The grease on the left, above, represents increased yield produced by using General Mills Aliphat 26-B in place of tallows.

The old saying "penny wise and pound foolish" still makes a lot of sense—especially as applied to the grease field. Here's why.

You Have A Choice to make in purchasing fats for grease-making. You can buy whole fat tallows, perhaps saving a few pennies on cost, or you can buy purified fatty acids, adding many more pounds of grease to every batch. Which choice leaves more profit on your books?

You'll find the answer to that in the way more and more grease-makers are changing to General Mills Aliphats—fatty acids produced carefully for purity, uniformity, and flexibility. They give you the right combination of acids for a maximum yield of constant grade greases. That's why General Mills has become a major supplier of fatty acids for soda-base greases, lithium greases, calcium greases, and other metal greases.

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For More Grease from your kettles, let General Mills Aliphats show you what they can do. They contain five percent more reactive materials than whole fat tallows, and often boost grease yields 10 to 25 percent higher.

General Mills Aliphats saponify almost instantaneously, reacting many times faster and more completely than whole fats. More batches of grease can be produced as well as more pounds to the batch.

With higher grease yields and faster "kettle turn-over" you raise the productivity of your plant. You also get more grease production from your equipment, and your labor cost is lower per pound of grease.

Benefit from another trend in buying raw materials. The modern way to cut handling costs is to get General Mills Aliphats in pallet shipments; 50-pound multiwall paper bags glued to disposable corrugated paper pallets—40 to 60 bags to the pallet. Your warehouseman simply handles the bags with a lift truck.

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See For Yourself the actual superiority of General Mills Aliphats. Chances are you'll find a modern fatty acid tailored to fit your own grease-making needs.

For instance, there's Aliphat 26-B. Because stearic acid content is high and the myristic acid is almost completely removed, this Aliphat often is used for making lime greases, and gives especially high yields of soda-base greases. There's Aliphat 26-C with its low concentration of poly unsaturated acids which reduce gumming tendencies. Uniformity and light color make 26-C a favorite with lime-grease makers. The high stearic content, compared to mixed animal acids, boosts the yield of calcium greases.

Then there's Aliphat 6-C, used for certain lithium greases . . . Aliphat 6-B, recommended for soluble oils . . . Aliphat 46-C, often mixed with tallow acids for use in making lime greases requiring good mechanical stability . . . and Aliphat 26-A, an experimental fatty acid that shows promising results for soda-base grease. General Mills also supplies hydrogenated tallow glycerides for special uses which require them.

For more information on General Mills Aliphats (fatty acids) for grease-making, just mail the coupon below. It's a sure start to more economical production—the way to be both penny and pound wise.

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Patents and Developments

Dilinoleic Ester-Lithium Soap Base Greases

C_1 to C_{18} alcohol esters of dilinoleic acid may be thickened with minor amounts of a lithium soap, according to U. S. Patent 2,673,184 issued to Standard Oil Development Company to give novel lubricating greases.

Linoleic acid may be polymerized by heating at 330°-360°C, preferably in presence of an acid clay catalyst in an atmosphere of steam at 85-400 psi and for 3-8 hours, yielding a product consisting essentially of the dimer, with about 12% of trimer. The esters of the dimer may be prepared in the usual manner, and the diesters may be hydrogenated, if desired.

The lithium soaps of fatty acids, such as stearic, oleic, fish oil acids, hydroxystearic, etc. may be employed as the thickener for the esters, which may be admixed with other esters such as phthalates, adipates, sebacates, etc.

A typical example of a grease produced in accordance with the patent is as follows:

FORMULATION

	Per Cent
Methyl ester of dilinoleic acid	50
C_8 oxo adipate	34
Lithium complex soap*	15
Oxidation inhibitor	1

*1:1 ratio of the lithium soap of hydrogenated fish oil acids and lithium crotonate.

PREPARATION

The esters were admixed with soap in dry form and the total mixture heated with stirring to about 520°F. The oxidation inhibitor was then added and the grease chilled by pouring into thin layers in a metal pan.

PROPERTIES

Dropping point, °F.	382
Penetrations, 77°F., mm./10:	
Unworked	200
Worked (60 strokes)	210
Worked (50,000 strokes)	235
Water washing test, % loss	No loss

Thixotropic Compositions

In U. S. Patent 2,673,838, use of hydrogenated castor oil is made to prepare thixotropic compositions, without the use of soaps, some of which may be employed for lubricating purposes where light greases are generally employed. For example, a medium white oil containing 2.5% of fully hydrogenated castor oil gives a white, semi-solid thixotropic composition of grease-type consistency, suitable for a soft grease in the food industry where taste and other factors would be affected by soaps and other constituents of ordinary greases.

The hydrogenated castor oil is dispersed as solid particles of submicroscopic size in the liquid oil base. Other materials, such as petroleum sulfonate rust inhibitor, extreme pressure agents, powdered mica, etc. may be added.

Greases Containing Surface-Esterified Siliceous Solids

Greases containing a water-insoluble lubricating oil thickened with an organophilic pulverulent solid consisting essentially of inorganic siliceous particles having large surface areas in proportion to their mass, are described in the Du Pont patent 2,676,148. The surface of the particles is modified by means of chemically bound-or groups, where R is a hydrocarbon radical having 2-18 carbon atoms, so that the solid material has greater affinity for organic liquids than for water.

The preparation of the thickening agents, which are called estersils, is described in greater detail in Patent 2,657,149. The siliceons powder substrates have an average specific surface area of at least 25 sq. m. per g. They are very porous, and the particles are joined in very open networks. These substrates are reacted with saturated primary or secondary alcohols containing 3-6 carbon atoms. The esterification takes place under anhydrous conditions, with water content of the liquid phase being maintained at 3% or less for hydrophobic products, and 1.5% or less for estersils of maximum esterification.

The estersils so produced are fine, light, fluffy, voluminous powders, easy to disperse in lubricating oils, absorbing no methyl red dye and exhibiting outstanding stability toward water and certain other chemicals. They are blended into the water-insoluble lubricating oils by milling or mixing.

The grease products obtained in this manner appear completely homogeneous and no grit is visible. The products are usually clear and transparent and thus have improved appearance over conventional oil-metal soap greases. With oils of moderate or low viscosity, the greases have a buttery texture. With relatively high viscosity oils (say around 2,000° SUS at 100°F) greases of a more tacky nature are obtained. The greases are claimed to possess excellent shear stability and have unusual water-resistant properties in comparison with conventional water-resistant calcium, aluminum and lithium soap greases. Long exposure to humid conditions such as 150 hours at 120°F and 100% relative humidity are said to leave these compositions unaltered.

A siliceous substrate was prepared as follows:

One volume of a solution of 0.48N sulfuric acid was added at a uniform rate over a period of 30 minutes, at a temperature of about 30°C., to three volumes of a solution of sodium silicate containing 2% SiO_2 and having a molar SiO_2:Na_2O ratio of 3.36:1. The sulfuric acid solution was chemically equivalent to 80% of the Na_2O in the sodium silicate solution. Vigorous agitation was provided to insure complete and instantaneous mixing and the temperature of the reacting mass was maintained below 40.C. throughout. During the acid addition, the pH dropped from 11.3 to about 9 and the sodium ion concentration remained below 0.3 N throughout the process. A clear sol resulted.

The sol obtained by the above step contained 1.5% SiO_2. The solids in the sol consisted of dicrete particles of silica having an average diameter less than 5 millimicrons, too small to be measured by the electron microscope.

The sol was heated to 95°C. Solutions of sodium

machines that work for machines

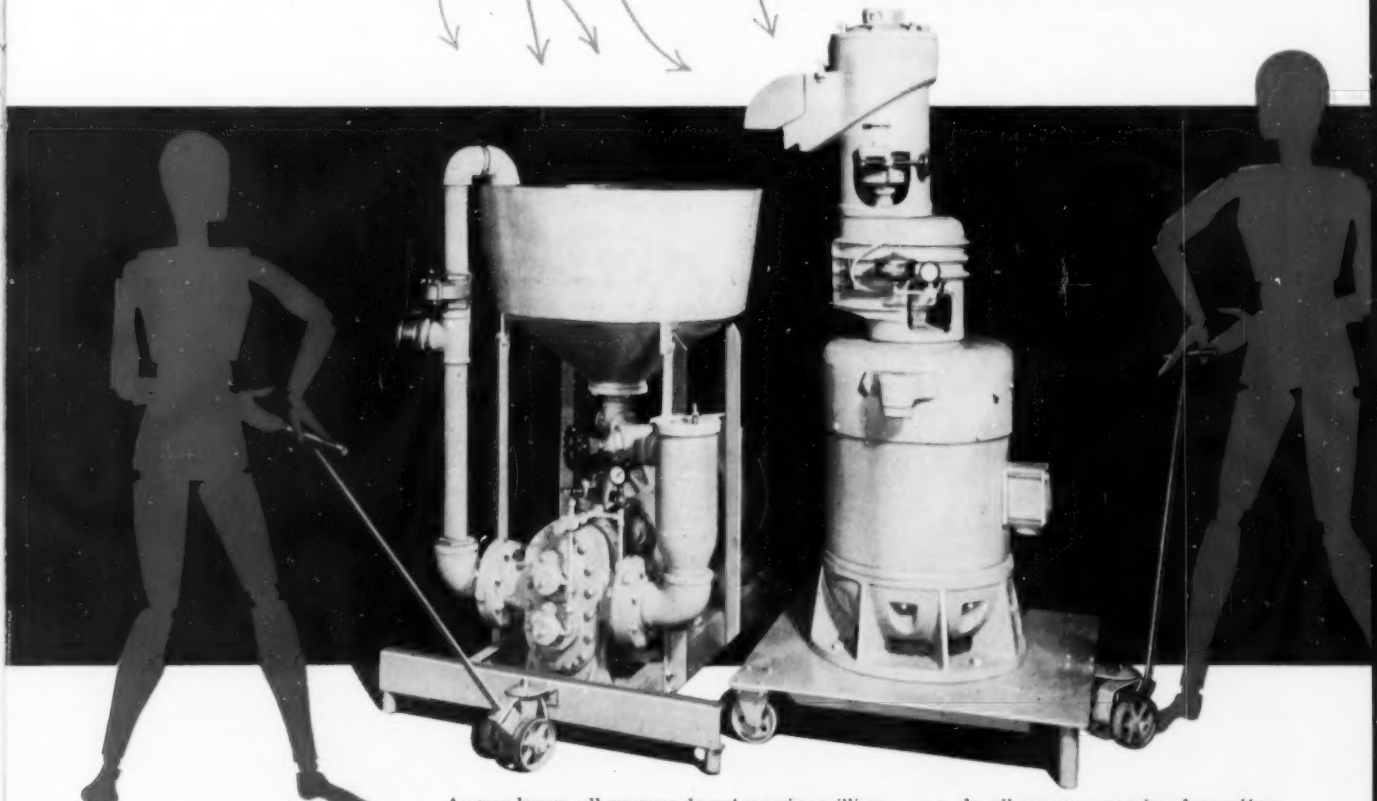
We usually think of machines as working for men, and ultimately, of course, they all do. But many, many machines exist only to work for other machines. You'll frequently find a machine that makes or processes component parts or materials for another machine . . . or, provides the motive power for another machine . . . or, controls another machine.

In the case of the Morehouse Mill, we find a machine that is in the unique position of helping *all* other machines . . . by participating in the production of the many standard and specialized greases needed to keep those other machines operating efficiently and effectively.

Today, greases of many types are being made with better uniformity, greater homogeneity, and higher quality because they are processed, in one or more stages of their production, on Morehouse Mills.

Basically, a Morehouse Mill imparts a shearing or tearing action to the product processed. In one sense it is a super grinding mill . . . a mill brought to a high degree of perfection by decades of research, field tests, and plant operation on hundreds of products. As the material passes between the stator and rotor below, the intensity of the shearing forces is determined by the peripheral speed of the rotor, the clearance between the stator-rotor surfaces, and the rheological properties of the material.

Thus, in your plant, the Morehouse Mill may be used to accomplish reduction of particle size, dispersion of particles, production of colloidal systems, homogeneization, or dispersion of fillers. The result . . . a possible if not definite upgrading of your product, better customer satisfaction, more widespread acceptance, a better competitive position, and . . . better profits.



The Morehouse Mill and grease deaerating equipment illustrated produces up to 25,000 lbs. of high quality grease per hour. Each unit independent, portable. Note casters and tow attachment. Portable and non-portable units of lower capacity are also available.

As you know, all greases do not require milling . . . nor do all greases require deaerating. However, a grease frequently will require one and not the other . . . or it may require both. That is why Morehouse Mills are available separately or in combination (no plumbing required) with Morehouse deaerating equipment. All equipment can be made portable.

Complete technical information on Morehouse Mills and deaerating equipment, the results on their use in the field, and the services of our field engineers in solving your particular grease processing problems are available to you without obligation.

Look for This Pennant on Grease Processing Equipment . . . It is Your Indication of Leadership

MOREHOUSE® INDUSTRIES

Since 1898 • Originators of high-speed stone milling equipment and sole manufacturers of Morehouse Mills.
1156 San Fernando Rd., Los Angeles 65, Calif. Sales Offices in Principal Cities. (Cable Address "MORESPEED", L. A.)

silicate and sulfuric acid were added simultaneously at a uniform rate over a period of two hours. The sodium silicate solution added contained 10% SiO_2 and had a molar SiO_2:Na_2O ratio of 3.36:1. The sulfuric acid was a 4% aqueous solution and was added in amount sufficient to neutralize 80% of the Na_2O in the silicate solution. The addition of silicate and acid was continued until one part of SiO_2 had been added for each part of SiO_2 present in the initial sol. During the additions, vigorous agitation was employed. The pH of the mixture slowly rose from 9 to 10 during the additions and was then maintained at about 10. The sodium ion concentration remained below 0.3 N throughout the process.

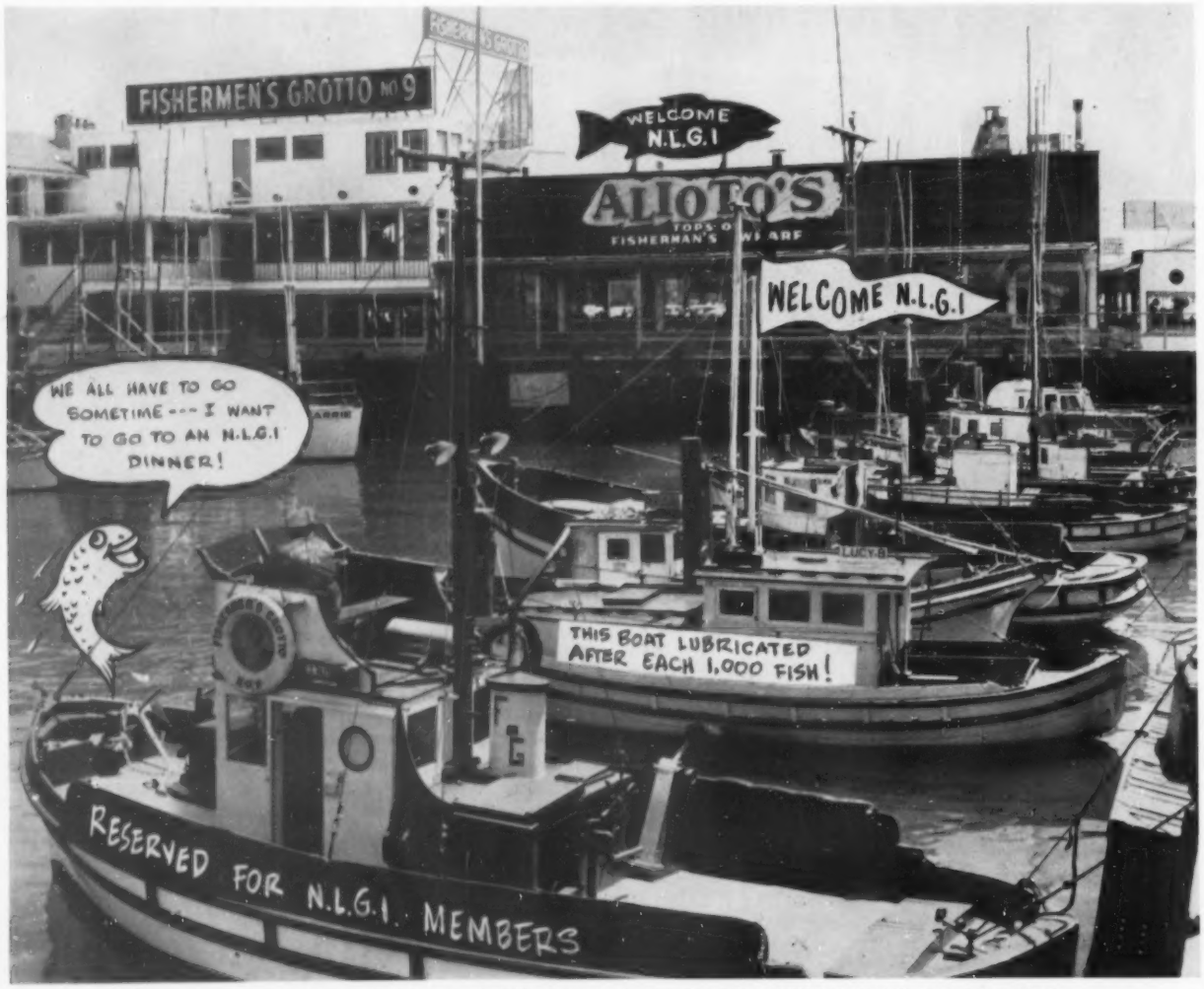
During the heating of the initial sol and the subsequent addition of silicate and acid, the tiny discrete dense ultimate particles of silica increased in size and they became chemically bound together in the form of open networks or coherent aggregates of super colloidal size. This action is called the "build-up" step. The aggregates precipitated so that the resulting mass was in the form of a slurry.

To aid filtration, the slurry was further flocculated with a 2% solution of a mixture of cetyl and lauryl trimethyl ammonium bromide, 0.16% of the mixed compounds being added, based on the weight of the silica. The slurry was filtered and the wet filter cake reslurred in water. The reslurry was adjusted to about pH 7 with dilute sulfuric acid, then filtered, and the filter cake washed with water. The undried filter cake as obtained on a vacuum filter contained about 12.5% SiO_2 by weight. The specific surface area of a sample of the substrate material, after drying in air at 120°C., was approximately 300 m. ^{2}/g. as measured by the aforementioned nitrogen adsorption method.

The esterification of the substrate was carried out as follows:

Twenty-two hundred grams of the wet filter cake containing about 275 grams of silica was slurried in 6 liters of n-butanol. The slurry was placed in a 12 liter, three-necked flask equipped with an electric heating mantle, a thermometer, a mechanical stirrer, and a three-quarter inch column three feet long, packed with 1/8 inch glass helices.

The slurry was heated and material allowed to distill at a reflux ratio of about 2:1 until the distillate no



Even San Francisco's famed Fisherman's Wharf is ready for the NLGI ANNUAL MEETING—October 25-27.

longer separated into two layers and the pot temperature had risen to above 116°C. indicating that most of the water had been removed by azeotropic distillation. The heating and distillation required about 13 hours.

The slurry was then transferred to a three gallon stainless steel autoclave and heated to 200°C. under autogenous pressure. When that temperature was reached the heat was cut off and the autoclave allowed to cool to room temperature. The heating required about 2.5 hours.

The water content of the alcohol phase of the slurry in the autoclave, at the end of the treatment, was about 0.2%. The slurry was filtered and the filter cake dried at 75°C in a vacuum oven for about 24 hours.

The dried material was a fluffy white powder. It was organophilic and hydrophobic. It had a specific surface area of 277 m.²/g. It showed no adsorption of methyl red dye indicating that the specific hydroxylated surface area was zero. The bulk density of the estersil product was 0.134 g/cc. under a compressive load of 3 p.s.i. Analysis showed that the product contained 87.67% SiO_2 and 6.56% carbon.

A grease was prepared using the estersil obtained above by mixing the estersil with a Mid-Continent solvent treated petroleum oil (viscosity 300 SUS at 100°F., viscosity index=100) in an oil-estersil weight ratio of 6.5:1.

The estersil was initially worked into the oil using a mortar and pestle until a fairly homogeneous mixture was obtained. The mix was then passed thru a Kent three-roll ink mill with the rolls set for clearance of 0.0015 inch. Seven passes through the mill were made to insure complete mixing and give a homogeneous product. The grease obtained was clear and buttery. Its consistency was equivalent to about a No. 2 to No. 3 grade cup grease. It had a micropenetration value of 89 at 77°F. as measured by the A.S.T.M. micropenetration method (A.S.T.M. Bulletin No. 14, August 1947, pages 81-85).

The grease of this example had outstanding stability to elevated temperatures. Thus, the appearance and consistency of the grease remained excellent even after heating it in an oven at 140 to 150°F. in an open beaker exposed to air for 33 days. At the end of this period, its consistency, as measured by the micropenetration method, was 95 at 77°F. after being worked with a spatula roughly equivalent to about 60 strokes of an A.S.T.M. grease worker. Thus, only a slight permanent thinning of the grease had occurred.

After storage for 31 days in an oven at 210 to 220°F., the appearance of the grease was still good; it had not dried out nor had it separated or visibly bled. It had a micropenetration value of 71 after being worked with a spatula as before.

The grease did not melt at elevated temperatures, showing no dropping point up to 410°F. as tested by the A.S.T.M. standard method (A.S.T.M. D566-42, A.S.T.M. Standards Part 5, p. 940, 1949). In fact the grease did not melt even upon ignition of the oil. In contrast, all soap greases have definite melting points considerably below 410°F., some of them at around 200°F.

The grease of the example was unusually resistant to moisture. This property was illustrated in a test in which a sand-blasted 2 x 4" mild steel panel was covered with about 1/16" thick coating of the grease and was suspended in a humidity box at 100% relative humidity and 120°F. for 150 hours. The grease showed no appreciable H_2O adsorption, as evidenced by retention of clarity, no separation of estersil, and did not thin out or bleed. It gave good protection against corrosion of the metal. Common sodium soap greases, in contrast, disintegrate under the above conditions.

The grease of the example had unusual resistance to oxidation. This property was illustrated by a test employing the standard Norma-Hoffman oxygen bomb method. In this test, the pressure had not dropped 25 p.s.i. even after 400 hours. In contrast, the average uninhibited soap grease fails in from 80 to 150 hours in this accelerated test.

The grease had excellent shear stability. It had substantially the same micropenetration value at 77°F. after 100 passes thru a 250 mesh screen in a Hain microworker as it had before the test was started. The amount of shear provided by this test is roughly equivalent to 100,000 strokes in a standard A.S.T.M. grease worker.

In wear tests run on the standard Cornell (1 lb. load on lever for 6 hours), Timken (5 lb. load on lever for 1 hour, 760 R.P.M.) and Almen (2 lb. load on lever for 1 hour) test machines, the estersil grease of this example proved to be as good or better than a variety of soap greases tested under the same conditions.

In seizure tests on the Cornell machine, the estersil grease resisted seizure at loads up to 4,000 lbs. on the lever. In contrast, the best of a variety of soap greases tested failed at about 1,250 lb. load.

TECHNICAL COMMITTEE

***Chairman* T. G. ROEHNER,**

Director of the Technical Service Department
Socony-Vacuum Laboratories

Pat Zweifel, Chairman of the Subcommittee on NLGI Classification of Lubricating Greases, is organizing working groups to study the following possible modifications of the NLGI classification system:

(a) Advantages and disadvantages of adding softer grades to the present system.

(b) Elimination of the gap between the current grades.

The classification has been widely adopted within this country and abroad. It is obvious, therefore, that no changes will be proposed unless the study indicates that the benefits will more than compensate for inconveniences incurred because of the changes. In any case, the study will be worth while as a step to make certain that the classification is kept in step with the current needs of industry.

Harry Bennetts has under consideration a recommendation that the classification be republished. He would welcome any ideas as to the form which the members would find most convenient.

NLGI Associate and Technical Mem

CONTAINER AND CLOSURE MANUFACTURERS

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Representative—Henry Frazin

Continental Can Company, Inc.
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Representative—T. A. Graham

Geuder, Paeschke & Frey Company
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Representative—Neil Savee

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Representative—John H. Strome

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Representative—Jerry Lyons

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Representative—Lawrence F. McKay

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Representative—F. J. Blume

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Representative—Mahlon E. Rieke

Trilla Cooperage, Inc.
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Representative—Lester Trilla

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Division, United States Steel Company
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Representative—Wm. I. Hanrahan

Vulcan Stamping & Mfg. Co.
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Representative—H. B. Scharbach

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Disney near Marburg, Cincinnati 9, Ohio
Representative—Richard P. Field

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Representative—B. A. Beaver

Lincoln Engineering Company
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Representative—G. A. Hubbard

Stewart-Warner Corporation
Alemite Division
1826 Diversey Parkway, Chicago 14, Illinois
Representative—D. C. Peterson

United States Air Compressor Co.
5300 Harvard Ave., Cleveland 5, Ohio
Representative—C. A. Bening

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Representative—Hal U. Fisher

Canadian Petrofina Limited
1015 Beaver Hall Hill
Montreal, Quebec, Canada
Representative—M. E. Wight

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Representative—H. F. Wagner

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Mid-Continent Bldg., P. O. Box 381, Tulsa, Okla.
Representative—J. W. Basore

Valvoline Oil Company
Division of Ashland Oil & Refining Co. Box G
Freedom, Pennsylvania
Representative—D. A. Smith

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The Girdler Company
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Louisville 1, Kentucky
Representative—J. E. Slaughter, Jr.

Manton Gaulin Mfg. Co., Inc.
44 Garden Street
Everett 49, Massachusetts
Representative—G. W. Eldridge

Morehouse Industries
707 Henry Grady Building, Atlanta 3, Georgia
Representative—George E. Missbach

The C. W. Nofsinger Company
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Representative—C. W. Nofsinger

Stratford Engineering Corporation
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Representative—J. W. Sylvester

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New York 20, New York
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Archer-Daniels-Midland Company
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Cleveland 2, Ohio
Representative—Frank C. Haas

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Representative—H. F. Whitler

The Baker Castor Oil Company
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Representative—H. H. Fritts

Darling & Company
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Representative—G. W. Trainor

E. I. du Pont de Nemours & Co.
Wilmington, Delaware
Representative—John R. Sabina

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Representative—Frank X. Sieloff

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Representative—R. F. Brown

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Representative—James Fentress

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Minneapolis 1, Minnesota
Representative—Abner C. Hopkins, Jr.

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W. C. Hardesty Company, Inc.
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Leffingwell Chemical Company
P. O. Box 191, Whittier, California
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Lithium Corporation of America, Inc.
Rand Tower, Minneapolis 2, Minnesota
Representative—Walter M. Fenton

...bers...

Supporting Your Organization These Suppliers to this Industry and Marketers of its Products Hold Membership in NLGI

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Baroid Sales Div., 111 Broadway, N. Y. 5, N. Y.
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Representative—Richard Bender

Newridge Chemical Company
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Representative—T. E. Shine

M. W. Parsons—Plymouth, Inc.
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Representative—Garry B. Curtiss

Swift & Company
165th & Indianapolis Blvd., Hammond, Ind.
Representative—F. H. Beneker

Vegetable Oil Products Co., Inc.
Vopcolene Division
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Representative—C. F. Williams

Warwick Chemical Company
Division Sun Chemical Corp., 10-10 44th Ave.
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Representative—Dr. J. J. Whitfield

Witco Chemical Company
75 East Wacker Drive, Chicago 1, Illinois
Representative—E. F. Wagner

TECHNICAL AND RESEARCH ORGANIZATIONS

Institut Francais du Petrole
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Rueil—Malmaison (S. et Oise) France

Les Laboratoires de Recherches Purfina
31 rue de la Loi, Bruxelles, Belgium
Representative—R. Gillerot

Midwest Research Institute
4049 Pennsylvania, Kansas City 2, Missouri
Representative—Dr. M. H. Thornton

Petroleum Educational Institute
9020 Melrose Avenue, Los Angeles 46, Calif.
Representative—G. A. Zamboni

Phoenix Chemical Laboratory, Inc.
3953 W. Shakespeare Ave., Chicago 47, Ill.
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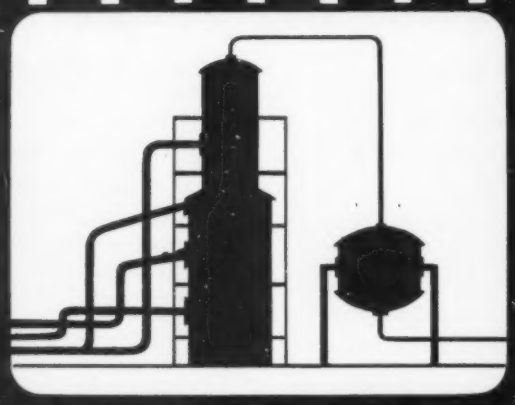
Sociedad Nacional de Petroleos
Rua D. Pedro V, no. 80, Lisbon, Portugal
Representative—Manuel Corda Boullosa

Century Products

for the lubricating grease industry



Have you investigated the outstanding qualities of Cenwax A and Cenwax G in the compounding of lithium greases?

Cenwax A (12-Hydroxystearic Acid) produces grease with exceptional shear stability, good water resistance, and stable greases over wide temperature ranges. Compounding greases at low temperatures as well as quick cooling are desirable features.

Cenwax G (Hydrogenated Castor Oil Glyceride) An excellent glyceride of 12-Hydroxystearic acid where the use of a glyceride is preferred because of processing conditions.

Write for specifications and samples

W. C. HARDESTY CO., Inc.

Century Stearic Acid Products, Inc.

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY
PLANT: DOVER, OHIO
In Canada: W. C. Hardesty Co. of Canada Ltd., Toronto

On the following four pages the Spokesman outlines a western round trip to and from the Annual Meeting. It's a vacation for the entire family through the most beautiful parts of the magic West at budgetary expense.

NLGI
Annual Meeting
San Francisco, October 25-27

Vacationing Through the Magic West to the NLGI ANNUAL MEETING

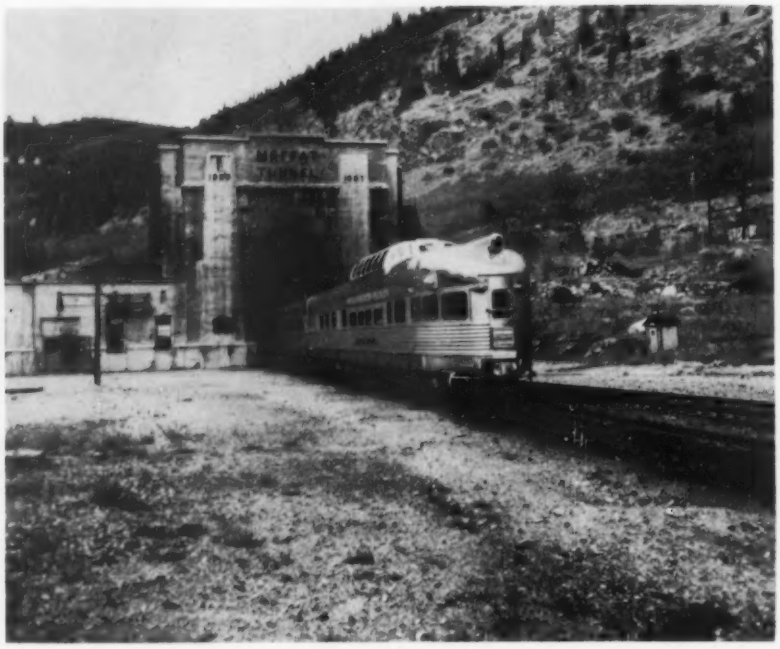
ABOVE . . . typical of a dream train traveling between lofty mountains along roaring river courses. There is always the smiling hostess to help you and your family enjoy unsurpassed majestic scenery from the dome of a modern streamliner.

RIGHT . . . below the glass dome . . . you and your family can relax and enjoy yourselves from the comfort of a double bed room pictured here. These ample quarters cost no more than a drawing room.

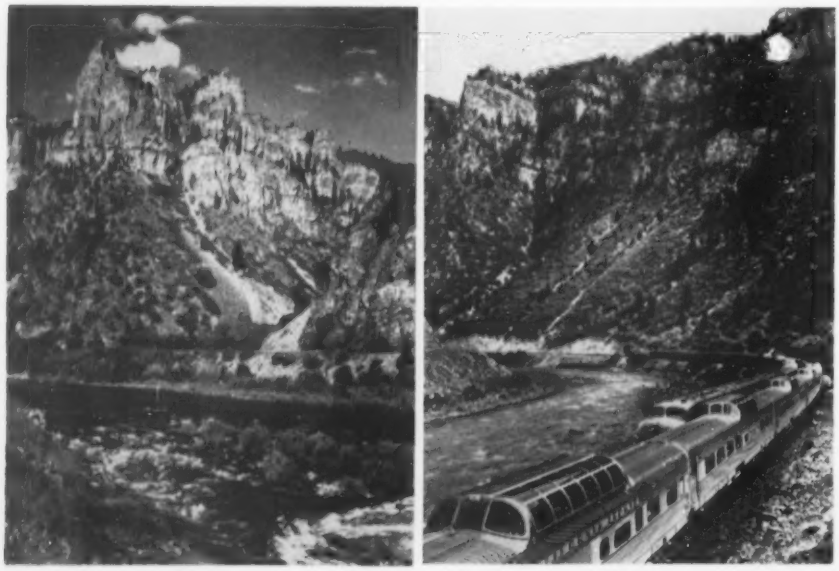
THE NEXT FOUR PAGES WILL GIVE YOU AN IDEA OF WHAT YOU WILL SEE ON YOUR TRIP.

Here are Some of the Things You Will See on the Trip West

WESTBOUND . . you leave Chicago in mid-afternoon speeding smoothly during the night over the farmlands of Iowa and Nebraska, arriving at Denver the next morning for breakfast. There you can stop over and see such sights as the Denver Civic Center and Municipal Building with the Colorado Rockies in the Background.

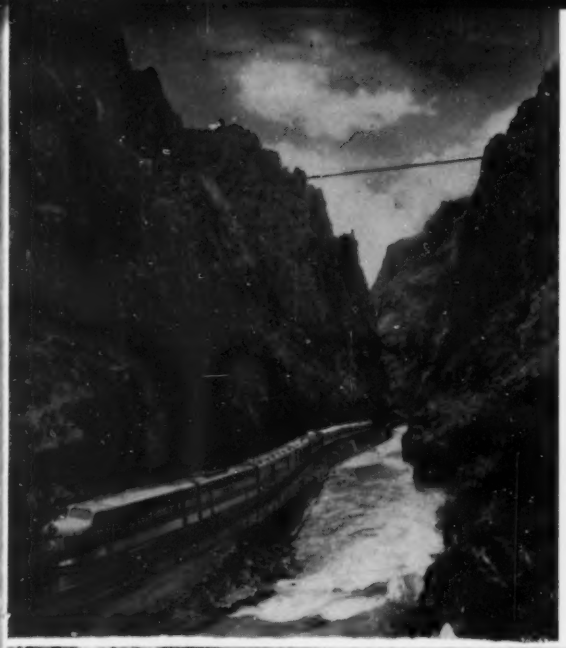


LEAVING DENVER . . . you climb 4,000 feet up in 50 miles where you enter the Moffat Tunnel. Then for 6.2 miles you travel through it penetrating the Continental Divide. Then for over 200 fascinating miles you wind through vast stretches of evergreen forest and the rock-walled canyons of the Colorado River.



Most wonderful of all Colorado River chasms . . . 18 mile Glenwood Canyon. LEFT . . . Colorado River and Glenwood Canyon. Your train travels on the tracks seen across river . . . RIGHT you pass sister train going East in same Canyon.

BELOW . . . you see cattle grazing as you look from your window.



ABOVE LEFT . . . on your way you could go through the Royal Gorge in the heart of the Grand Canyon of the Arkansas River. Your train makes a ten minute stop here for you to admire it's unparalleled beauty.

ABOVE RIGHT . . . Now you've arrived at Salt Lake City. How about a tour to at least see Temple Square.

LEFT . . . the next morning after leaving Salt Lake City your train enters California crossing the Sierra Nevada at Beckwourth Pass. Then, for 118 marvelous miles you follow the twists and turns of the turbulent Feather River. Sometimes you glide along the river's edge, then hundreds of feet above the floor of the gorge.

AT THE END OF YOUR TRIP . . . here is what you will see going from Oakland to San Francisco by ferry—the Oakland Bridge

Here you are at the end of your trip

. . . ready to Attend the NLGI Annual Meeting

October 25-27

YOUR TRIP BACK HOME . . . could include stops in Los Angeles and San Diego

ABOVE . . . you stop in Los Angeles for a tour. Here you are looking north at Sunset and Vine.

Take Advantage of Family Rates

Now you can use family rates that are quite liberal. Here is a sample tour offered by one railroad from Chicago to Los Angeles, San Diego and San Francisco.

If you take your family, and many are, you must leave Chicago on a MONDAY, TUESDAY or WEDNESDAY. The husband can return alone, with the rest of the family returning at a later date. Your tickets are good for stop-overs at any point en route at no additional cost.

You and your family will travel in streamlined, air-conditioned trains at less expense than driving your own car. For further information about other trips—consult your railroad agent or travel bureau.

BELOW . . . then on to San Diego. You stop at Balboa Park to admire a building and lily pool.

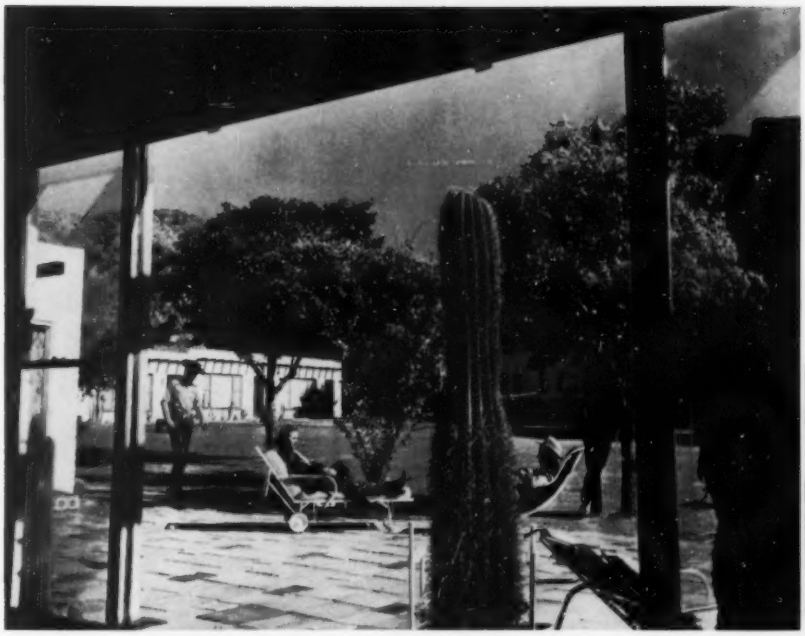
EXAMPLE OF ROUND TRIP FAMILY FARE FROM CHICAGO TO LOS ANGELES, SAN DIEGO & SAN FRANCISCO

Head of family	$126.45
Wife	77.65
Children 12 years of age and under 22	77.65
Children 5 years of age and under 12	38.85
Children under 5 years of age	Free

(Rates do not include Pullman or 10% Federal tax)

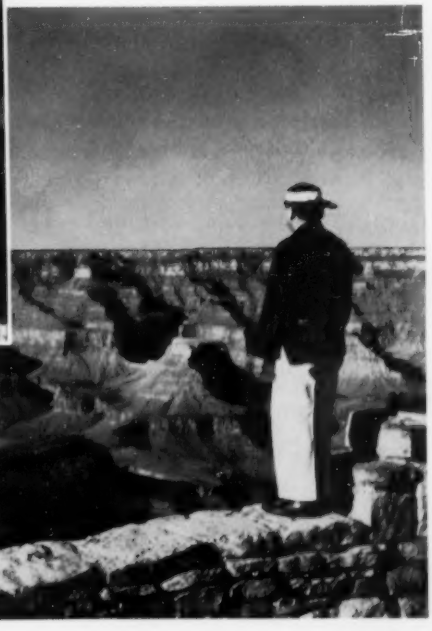
RIGHT . . . of course your trip must include an orange grove. This one is at Fullerton near Los Angeles.

Continuing Your Trip Back to Chicago You Can Take These in



A relaxing stop-over on your way home. Royal Palms Inn near Phoenix, Arizona.

Or . . . you might join this small party of riders returning from a pleasant ride through giant saguaro studded desert near Phoenix.

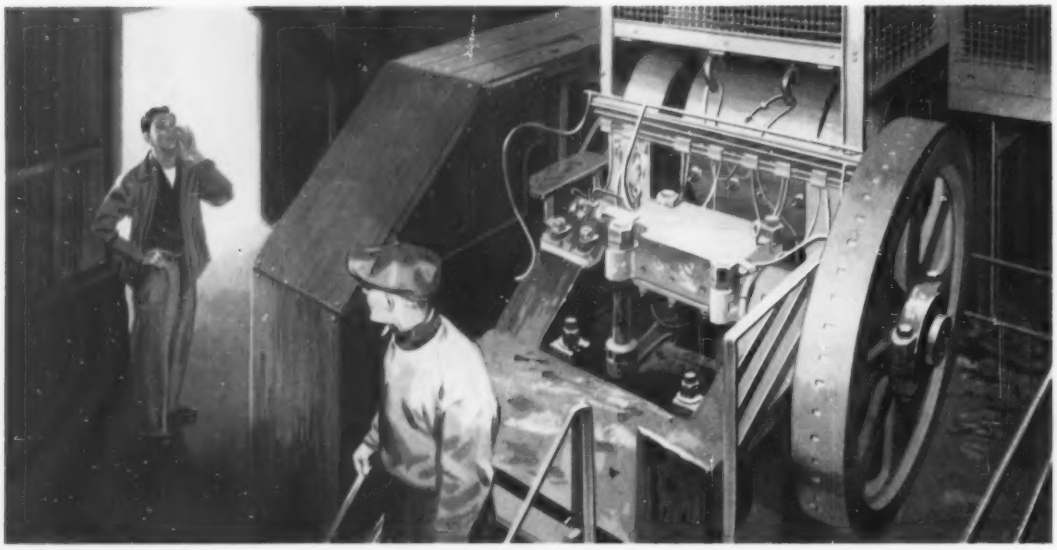


ABOVE . . . here you are on the south rim of the Grand Canyon. Your trip home can include this magnificent sight.

RIGHT . . . Chief Porter Timeche views some western real estate from the south rim of the Canyon. He's from the Hopi tribe.

Bentone* 34 greases *better*

for longer trouble-free service life!



HERE'S WHAT BENTONE* 34 GREASE USERS SAY . . .

"During 12-month test on 4′ x 5′ jaw crusher, using a Bentone grease, reduced grease consumption by 4,837 pounds; an annual savings of $2,728 in grease cost over grade of grease formerly used."

"Grease clean-up time has been reduced 156 man hours per year, and 78 hours of operating time per year formerly lost for hot toggles have been eliminated."

WRITE FOR FREE BROCHURE — This Bentone* 34 fact book tells you what it is, how it's made, how it gels, and why Bentone greases are superior. Write for your personal copy today.

Dutch Boy ®
TRADEMARKS REGISTERED U. S. PAT. OFF.

BENTONE* 34
THE NON-SOAP GELLING AGENT

NATIONAL LEAD COMPANY
BAROID SALES DIVISION ★ P. O. BOX 1675 ★ HOUSTON 1, TEXAS

PEOPLE in the Industry

Deep Rock Promotes Gockel and Gunness

A. R. Gockel, manager of Deep Rock Oil Corporation's Sales Control department since 1951, has been named manager of the company's Bulk Sales department, it has been announced by W. M. Murray, vice president of Direct Sales.

Howard E. Burba, assistant to Gockel, has been promoted to manager of Sales Control under J. G. Campbell, vice president of Marketing.

Gockel joined Deep Rock in April, 1948, on special assignment to the company's Economic Survey committee. He was named assistant to the manager of the Supplies and Economics division in 1950 and was promoted to the job of manager of Product Supply and Distribution the following year. He was named head of Sales Control in September, 1951.

Gockel has a Bachelor of Engineering degree and an LLB degree from Yale university. He is a member of the Marketing Research committee of the American Petroleum Institute and a member of the Oklahoma Bar Assn.

Burba joined Deep Rock as a senior auditor January 1, 1952, and was named assistant manager of Sales Control in January, 1953. He is a 1946 graduate of the University of Oklahoma where he received a Bachelor of Science degree in Business Administration.

S. A. (Sy) Gunness, lubricating oil salesman for Deep Rock Oil Corporation in the Chicago area, has been promoted to assistant manager of the lubricating oil sales department, Manager L. H. Sullivan has announced.

Gunness will continue to maintain offices in Chicago and service Deep Rock accounts throughout the midwest and portions of Canada.

Gunness joined Deep Rock as lubricating oil engineer in October, 1927 after graduation from North Dakota State college where he received a B. S. degree in mechanical engineering. Subsequent promotions found him serving Deep Rock as manager of the lubrication department, division superintendent, and assistant division manager.

Samuel Rogers to Lithium Board

Samuel H. Rogers, vice-president of Northwestern National Bank of Minneapolis in charge of its Trust Department, was elected to the board of directors of Lithium Corporation of America, Inc. at the company's annual stockholders meeting in Minneapolis recently. He succeeds as a director, Karl M. Leute, former president and founder, who died March 24. All other board members were reelected. They include Fremont F. Clarke, George C. Crosby, Willis W. Osborne and Herbert W. Rogers of Minneapolis; DeWalt H. Ankeny of Saint Paul; Percy E. Landolt and M. Stuart Roesler of New York; and George Rieveschl of Detroit. Herbert W. Rogers, formerly secretary of the company, was elected president March 25 to succeed Leute. Charles S. Bellows was elected secretary April 2.

President Rogers, presiding, explained the recently announced $7,000,000 loan contracted for by the company to erect a new plant at Bessemer City, North Carolina to expand production of lithium products. Ground has been broken at the site, and utility contracts concluded. The plant is expected to begin operations by December 1. Production against already existing contracts is expected to be met by January, 1955.

Clarke, mining division head, predicted an eight year supply of ore reserves from the company's Black Hills, South Dakota mines as immediately available for operation of their St. Louis Park, Minnesota plant. Additional reserves in the Cat Lake area of Manitoba and Lake LaMotte region of Quebec extend their spodumene (lithium-bearing rock) reserves, he said. Ore deposits drilled and proven in North Carolina assure a 20 year supply for the new Bessemer City plant.

Dissolution of Metalloy Corporation, former wholly-owned manufacturing subsidiary, was confirmed.

One pound of crude oil can produce three times as much heat as a pound of TNT, which is made from toluene, an oil product.

Alfred W. Ward Died Suddenly

Alfred W. Ward, chairman of the board of The Brooks Oil Company, died suddenly at his home in Cleveland May 28.

Mr. Ward had been associated with the company since 1919. He served as president from 1940 until 1949, and as chairman of the board since that time.

Mr. Ward was born in Cleveland in 1895. He was a graduate of Cornell University, where he was captain of the basketball team. He spent two years in the Army during World War I.

He was a member of the Cornell Club, the Chagrin Valley Country Club and the Bahia Mar Yacht Club in Fort Lauderdale, Florida.

Surviving him are his wife, Helen, and his mother, Mrs. Alice Ward.

Two gallons of today's gasoline do the work three gallons did in 1925.

New Baroid General Manager

George B. Coale

Mr. George B. Coale has been appointed General Manager of the Baroid Sales Division, National Lead Company, succeeding George L. Ratcliffe, Vice-President of National Lead Company. Mr. Ratcliffe served as the General Manager of Baroid prior to Mr. Coale's appointment.

Mr. Coale graduated from the Naval Academy with the class of 1927. In 1935, he joined National Lead Company. At the time of his appointment as Assistant General Manager of Baroid in 1949, Mr. Coale was the Chief Engineer for the National Lead Company.

Mr. Ratcliffe will remain active with the Baroid Sales Division in his capacity of Vice-President, National Lead Company.

Beck Succeeds Taylor

Earl W. Beck, assistant general purchasing agent for Socony-Vacuum Oil Company, Inc., has been named as the company's general purchasing agent. He succeeds Joseph R. Taylor, who has retired under the company's annuity plan after 36 years of service. In his new post, Mr. Beck will have general supervision of all foreign and domestic purchasing operations for Socony-Vacuum and its affiliated companies.

Mr. Beck joined General Petroleum Corporation, Socony-Vacuum's affiliate on the West Coast, in 1923.

Printon Awarded Honorary Degree

Thomas A. Printon

Thomas A. Printon, President and Board Chairman of Nopco Chemical Company, Harrison, N. J., was made a Doctor of Laws by Boston College at Commencement in June.

A Boston College alumnus, Mr. Printon received the honorary degree in recognition of his distinguished career in the business world and his example of useful citizenship to the community.

Graduated from Boston College with an A.B. degree in 1917, Mr. Printon served as a Navy ensign during World War I.

After three years in the investment brokerage business, he joined the National Oil Products Company as a New England representative in 1922. The firm later became Nopco Chemical Company, Harrison, N. J.

Transferred to the home office at Harrison in 1932, he rose rapidly in the company, becoming a director in 1936. Mr. Printon has been President of Nopco Chemical Company and subsidiaries since 1949 and was elected Chairman of the Board and President this year.

Mr. Printon is a director of the Employers Association of New Jersey and a member of the West Hudson Manufacturers Club, the Newark Athletic Club, and the Maplewood, N. J., Country Club.

Manufacturing Appointments Announced By Shell Oil

L. R. Goldsmith was promoted to manager of manufacturing Shell Oil Company effective July 1, as announced by F. S. Clulow, manufacturing vice president. He succeeded A. H. Calderwood, who leaves shortly on an assignment abroad and retires at the end of the year.

J. E. Marsland, assistant manager of the technological department, succeeded Mr. Goldsmith as manager of that department.

Mr. Goldsmith was born at Pasadena, California, and received a B. S. degree in petroleum engineering from the University of California at Berkeley. He joined Shell in 1932 at Martinez, California, and later held various technical and operating positions on the West Coast. During World War II he served for two years in the Petroleum Administration for War at Washington. In 1946, he became superintendent of the refinery at Wilmington, California, and in 1949 he was appointed to the staff of the economic development department in New York. He became manager of the technological department in 1951.

Mr. Marsland was born at Philadelphia and received a B. S. degree in chemistry from the California Institute of Technology and an M. S. degree in chemical engineering from the Massachusetts Institute of Technology. He joined Shell in 1933 at Martinez and also served at San Francisco before becoming chief technologist at Wilmington in 1945. He was transferred to New York in 1948 as senior technologist and was appointed assistant manager of the technological department in 1949.

Reid Retires From Socony

Bryan S. Reid, general manager of the Chicago division of Socony-Vacuum Oil Company, Inc., retired on July 1 after 43 years in the oil industry.

He started in the industry in 1911 working for a company drilling for oil in Cuba, then returned to the University of Wisconsin where he received a bachelor of science degree in engineering in 1912. For several years after his graduation he was em-

ployed by various oil companies in the Southwest.

On Feb. 1, 1923, he organized the Inter Ocean Sales Corporation and served as its president until the company was sold to the Wadhams Oil Company, when he became assistant to the president of Wadhams. Subsequently Wadhams became part of the Socony-Vacuum organization. On July 1, 1932, Mr. Reid was named general manager of the Chicago division, a position he has held continuously.

He is a past president of the United Charities of Chicago and has been active in other civic groups. He is a member of the Twenty-Five Year Club of the Petroleum Industry.

Concurrent with Mr. Reid's retirement, John B. Wilbor became manager of Socony-Vacuum's Chicago division. Mr. Wilbor entered the oil business with Wadhams in 1929 after several years in research and development engineering. He has been assistant general manager of the Chicago division since Nov. 1, 1953, and prior to that was coordinator of supply and distribution for the central region of Socony-Vacuum.

Fentress Advances

Jim Fentress

Jim Fentress, former Manager of Petroleum Sales for Foote Mineral, has been made Director of Economic Planning, a new job recently created by the Board of Directors.

Fentress will report directly to L. G. (Tony) Bliss, Senior Vice President, and will have the staff responsibility of developing complete economic information and of making definite recommendations on present and future products, processes, raw materials, and facilities of interest to Foote.

Industry NEWS

Odds Against Car Trouble On Vacation

The chances are at least nine to one that you will be completely free of car trouble on your vacation trip, based on figures quoted by Shell Oil Company. The figures assume that you take reasonably good care of your car.

Here's how the statistics were compiled. The American Automobile Association recently released figures showing that breakdowns average out at one per year per car in the United States. This includes not only mechanical or electrical trouble and flat tires but such non-mechanical difficulties as running out of gas and being locked out of cars.

The average car owner drives about 12,000 miles a year, of which about 1,200 miles, or one-tenth, is on his two-week vacation trip. Therefore, if you hew to the average, there is only one chance in ten that your car will break down on your vacation trip.

The Shell statement pointed out that this speaks highly for the amazing dependability of today's motor car, particularly since even the odds of nine to one can be vastly increased by correct pre-vacation car care.

API Releases Jobber Advisory Group Survey

One hundred and thirty-three universities and colleges in 44 states stand ready to cooperate with oil jobber groups in setting up courses or institutes on business management.

This is shown in a survey just released by the jobber advisory committee of the American Petroleum Institute.

The survey was initiated last year as part of the committee's study of the role API's marketing committee could play in helping to develop management institutes for distributors and jobbers. The study was approved by the marketing committee at its annual meeting in Chicago last November.

The report on the survey including a catalog and file of supporting material was presented to the marketing committee at its Denver meeting May 17-18. The report points up the range of business management instruction already available to industry groups throughout the country.

These include programs sponsored by industry and administered by the colleges and universities. They range from correspondence courses and regular college studies, to special institutes or clinics lasting from one day

to four weeks.

Initially, the survey was undertaken to find out how many state universities offer extension courses in business management. The study was later broadened to include a report on the availability of extension services at municipal and city colleges when it was learned that some jobbers prefer to attend institutes near their homes rather than on a college campus.

A typical group of extension services offered by one of the universities includes: Accounting, industrial management, human relations in industry, supervisory training, business law and salesmanship.

The survey was conducted by the special educational program subcommittee, headed by R. A. Kent, Kent Oil Co., Kansas. L. T. White, Cities Service Petroleum Inc., acted as special consultant, organizing, cataloging and analysing the data on the universities which were gathered and submitted by members of the seven-man committee.

The group represented oilmen from all over the country and included E. K. Bennett, E. K. Bennett Oil Co., Texas; John F. Cummins, Cumberland Oil Co., Tennessee; M. D. DeTar, Aero Oil Co., Pennsylvania; Jess Knowles, Skelly Oil Co., Missouri; E. F. McCabe, Tide Water Associated Oil Co., New York; M. H. Robineau, Frontier Refining Co., Colorado; and George E. Savory, Savory Oil Co., New York.

Lummus Expanding

The Lummus Company Canada Limited this month began construction of two units for the new Canadian Petrofina Ltd. refinery at Point Aux Trembles, 10 miles northeast of Montreal, it was announced last month.

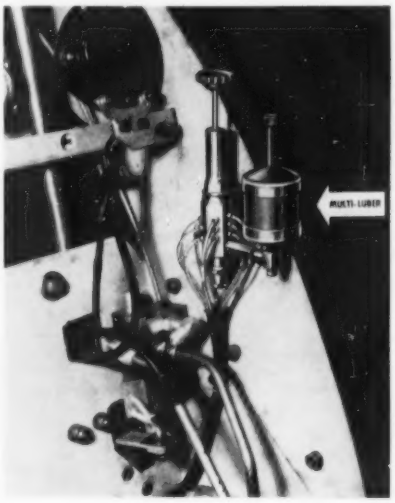
Completion of the units is scheduled for September, 1955. Number one is a Houdriflow Catalytic Cracking Unit (10,000 B/D) with fractionation section and Vapor Recovery Unit. Number two is a 3,000 B/D Hydrodesulfurization Unit (utilizing the Shell Process).

Ground breaking ceremonies marking the official start of construction were held May 15 with Prime Minister DuPlessis of Quebec officiating along with W. H. Howard, chairman of Canadian Petrofina Ltd.

New Centralized Lubrication System

Automatic Transportation Company has introduced built-in centralized lubrication in its line of fork lift trucks. Hailed as a feature which will improve performance, convenience, and safety—the centralized system is the Multi-Luber, manufactured by Lincoln Engineering Company.

With a Multi-Luber, the lift truck operator lubricates all vital steer-axle bearings simultaneously, with a single stroke of the control lever. Such complete flushing and lubrication of bearings eliminates down-time and man-hours for lubrication.



Multi-Luber lubrication is said to maintain a constant grease film at bearing points—thus greatly increasing bearing life as well as the cost of replacing bearings due to improper and inadequate lubrication.

The Multi-Luber has a lubricant reservoir with sufficient capacity for approximately 120 cycles of the system.

New Refining Unit at Swift Dallas Plant

Increased production of Swift & Company's acidless tallow for Texas and the Southwest has been made possible through a new refining unit recently installed in the Swift plant at Dallas. The Dallas plant was selected to utilize local production of raw materials for the rapidly expanding industries of the Southwest.

Chek-Chart Publication

The 1954 Motor Oil and Gear Lubricant Recommendations Wall Chart, a Chek-Chart Service publication, includes up-to-date, 1954 data on passenger cars, trucks, buses and motor coaches, farm tractors, motorcycles and outboard motors.

The stagger-fold cart with visible index tabs needs only 12½-13½ inches of wall space. Its seven tabular pages contain recommendations for passenger cars, motorcycles, trucks, farm tractors, buses and motor coaches and outboard motors. Like other Chek-Chart publications, information in the Wall Chart has been

compiled in collaboration with and has the approval of the vehicle manufacturers.

Passenger car data covers all U. S. models from 1942 through 1954—back to 1939 on some. Tabulations include recommendations for crankcase, transmissions (conventional, overdrive, semi-and fulll-automatic types) and differential. Capacity data for such components is also included.

Truck data includes all popular models of 19 U. S. makes, listing recommendations for crankcase, transmission and differential. Recommendations for the same components are tabulated for buses and coaches. Farm tractor recommendations, in addition to crankcase, tranmission and differential data, include final drive recommendations.

Outboard motor information includes all single-and twin-cylinder models built by 23 major manufacturers. Motor oil recommendations are listed along with oil-fuel ratios; gear lubricants are also shown for each make and model. Motorcycle data includes all popular makes and models; gives recommendations for motor oil and transmission lubricants.

Going over the $2 billion mark for the first time, gasoline and other automotive taxes collected in 1952 by the federal government totaled $2,100,066,269.

Constitutional amendments earmarking gasoline taxes and motor vehicle registration fees for highway purposes have now been adopted in 24 states.

Before the average American car is scrapped, it will have consumed 8,000 gallons of gasoline and run up $588 in gasoline taxes.

Approximately 1,000,000 miles of America's local roads, or 40 per cent of the total mileage, are used by less than 10 vehicles daily.

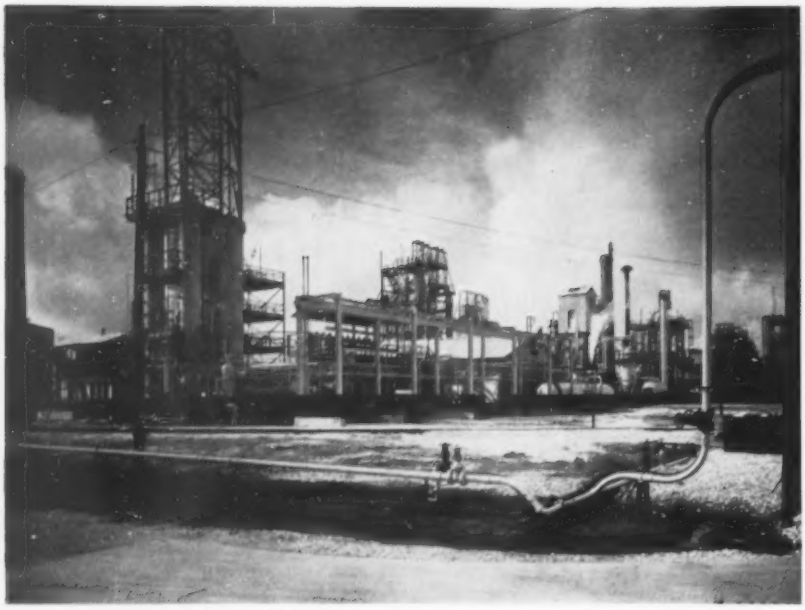
Award of Merit To Socony-Vacuum

An award of merit for effectively combating industrial waste pollution has been presented to the Trenton refinery of Socony-Vacuum Oil Company, Inc., by the Michigan United Conservation Clubs, a civic group consisting of 285 affiliated conservation and sportsmen's clubs throughout the state.

The Socony-Vacuum refinery was commended for " . . . effective abatement of industrial waste pollution and continued interest in conservation and the health and welfare of the people of Michigan."

This is only the second award of its kind which has been made to industry by the United Conservation Clubs in 17 years.

The presentation took place during the 17th annual conference and convention held by the clubs. Representing Socony-Vacuum were Donald E. Powell, chief process engineer of the Trenton refinery, and Alfred Doty, an employee of the refinery who is past president of the Trenton Sportsmen's Club. They accepted the award in behalf of S. G. Keller, refinery manager.



Pictured above is Gulf Oil's new iso-octyl alcohol plant at its Port Arthur, Texas, refinery. This plant has a yearly capacity of approximately nine million pounds of iso-octyl alcohol, an important industrial chemical used in plasticizers, synthetic lubricants, surface active agents, and agricultural chemicals. The liquid product is shipped from plant by railroad tank car.

API Establishes Safety Award

A Meritorious Safety Award has been established by the American Petroleum Institute to give public recognition and tribute to outstanding acts of heroism and first aid rendered by any person affiliated with the petroleum industry.

The Award consists of a certificate citing details of the act, a medal encased in a transparent block of lucite, and a lapel pin. The certificate is signed by the president of the Institute, and the head of the employee's company, and all three units are presented to the individual.

Sponsor of the Award is the Safety and Fire Protection Section of the Institute's Department of Technical Services. Said F. G. Wilson, head of the Safety section:

"The need for a life-saving award of this kind long has been recognized. Its adoption marks another milestone in the progress of the Institute in its efforts to serve the petroleum industry in all appropriate ways."

Only those acts performed since January 1, 1953 will be recognized. Qualifications state that "any person affiliated with the petroleum industry who, in the line of his duty or off the job, saves a life either because of an act of heroism which involved the risk of his own life, or because of the successful administration of first aid" is eligible.

Chek-Chart Announces New Publication

More than eighteen months of work are reflected in the pages of a new "service" publication, "The How and Why of TBA Sales and Service" just announced by the publisher, The Chek-Chart Corporation, Chicago, Illinois.

The 72-page book was planned, written, edited and illustrated to aid service station men in performance of the many car-care jobs that are a part of the professional tire, battery and accessory service that the motorist expects. Six sections, each liberally illustrated, cover Tire and Tube Service; Battery and Battery Cable Service; Body and Windshield Service; Cooling System and Oil Filter Service; Lighting, Spark Plug and Ignition Service and Brake, Muffler and Shock Absorber Service.

Gulf Now in Organic Chemical Market

Gulf Oil Corporation now is producing iso-octyl alcohol from a new plant at Port Arthur, Texas, and has begun shipping tank cars of the product. This marks the company's initial move into the general organic chemical market.

Completion of these facilities climaxes a development program by the company's research laboratories, which has successfully modified the Oxo process introduced by the Germans during World War II.

The plant represents another milestone in Gulf's progress in the conversion of its raw materials to useful chemicals. Previous chemical products of the company have either been made for internal consumption or sold under long term contract. Iso-octyl is the first high-grade chemical produced by the company for sale on the open market.

In this new phase of the company's chemical marketing, the iso-octyl alcohol is being offered in tank car quantities to manufacturers of plasticizers, synthetic lubricants, surface active agents, and agricultural chemicals.

The iso-octyl facilities were designed to provide a high degree of product flexibility. The plant is capable of several alternate Oxo syntheses, and—besides iso-octyl—can produce nonyl, decyl, tridecyl, and other higher alcohols.

While some of the higher alcohols named may not be produced immediately, the company plans to actively explore markets for them. They are used in plasticizers and synthetic lubricants, synthetic detergents and cosmetics.

The first stage of the process utilizes heat, petroleum hydrocarbons, carbon monoxide, hydrogen and a metal catalyst to produce octyl aldehydes.

The aldehydes so produced are purified in a second stage. In a third step, the purified aldehydes are converted to iso-octyl alcohol, using active catalyst, heat and pressure, and hydrogen.

In the final stage the alcohol is further purified by fractionation to remove small amounts of contaminants.

For Greater Harmony in Lubemaking

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Lead Naphthenates

30% and 33% soaps for better film strength, oiliness and anti-seize characteristics, plus anti-corrosion protection properties in gear oils. Their clarity is outstanding.

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Swift's TALLOW FATTY ACID No. 42 is an extremely light colored base product that is especially produced for the lubricating grease industry. You can depend upon its uniformity of color and rigid adherence to specifications from one lot to the next. Approved, and in demand, by large and small producers throughout the country, Tallow Fatty Acid No. 42 has high resistance to heat and is remarkably free of oxidized fats, color bodies and other materials which render many similar products unstable in use and difficult to control during processing.

A complete line of various grades of tallow fatty acids is available from Swift's plant and warehouse stocks throughout the U. S. The No. 42 grade is available in tank cars and in lined drums. Check over the list at left and write for further information on any of the many Swift's Industrial Oils and Fatty Acids that are daily serving diversified lubricating industry needs. Remember, too, that . . .

Oleic Acid (Red Oil)
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New Monsanto Booklet

Application versatility, demonstrated by 20 proven fields of use for Monsanto Chemical Company's Santocel, a silica aerogel, is described in a new booklet just issued by the company's Inorganic Chemicals Division.

The surface area of the different grades of Santocel—a cubic inch contains about 500 billion particles—serves to impart a variety of properties to the material. Uses described in the booklet include those as thickening agents for greases and printing inks, flatting for surface coatings, mold lubricants, dry grinding agent for DDT, anti-caking and bulking agent, as a reinforcing filler for silicone rubber, and as a thickener for polyester and epoxy resins used in low pressure moldings.

The new Santocel booklet outlines each of the fields of use, together with the general information on volumes used, and basic technical information on Monsanto's various types of Santocel. The booklet may be obtained from the Inorganic Chemicals Division, Monsanto Chemical Company, 710 N. Twelfth St., St. Louis 4, Mo.

Chek-Chart to Mark 25th Anniversary Year

High point of the 25th anniversary year celebration of The Chek-Chart Corporation, lubrication chart experts serving the oil and automotive industries, will be a "thank you" party in Detroit's Sheraton-Cadillac Hotel on the evening of Thursday, June 17, 1954.

According to Ray Shaw, president of the firm, Chek-Chart will be host to some 750 or more representatives of the oil and automotive industries at this event.

The pioneer Chek-Chart service, the first collection of standardized charts for lubricating all makes of cars, published in 1929, inaugurated the firm's 25 year span of service to the Oil and Automotive industries.

For the filling station of 1929, slowly evolving from a gas-pumper into a one-stop service station, the first edition of a standardized set of lubrication charts for all cars furnished a reliable basis for delivering the lubrication service sought by more and more motorists. Before its publication, service men either had to maintain their own files of individual car-owner's manuals for each make and model of car or turn business away.

Through the years, the compilation and publishing of succeeding editions of Chek-Chart Lubrication Guides and those of its clients served to point up areas of mutual interest to the oil and auto industries. In some measure, this helped pave the two-way street of closer cooperation between the vehicle maker and the oil marketer.

The benefits of such cooperation have, in the main, accrued to the nation's car owners.

The invitation list to Chek-Chart's "Salute to the Oil and Automotive Industries" has been in preparation for months. Automotive and oil men from all parts of the United States and Canada will be asked to attend. Some of the names on the list are those of men who are on the retired roster of companies in each of the industries. Others are those of men who are presently working in other fields but who were once identified with either the oil or automotive industries. All of them, however, are men who have helped Chek-Chart along its way to 25 years of service to both industries.

FUTURE MEETINGS of the Industry

JULY, 1954

24-25 Western Petroleum Refiners Association (regional meeting), Leonard Auditorium, Alma, Mich.

AUGUST, 1954

8-13 National Congress of Petroleum Retailers (8th annual session), Sir Francis Drake Hotel, San Francisco, Calif.

16-18 Society of Automotive Engineers (national West Coast meeting), Los Angeles, Calif.

SEPTEMBER, 1954

7-9 Assn. Of Desk & Derrick Clubs of North America (3rd annual convention), Banff Springs Hotel, Banff, Alta.

8-10 American Society of Mechanical Engineers (fall meeting), Schroeder Hotel, Milwaukee, Wis.

8-10 Oil Industry Information Committee, Conrad Hilton Hotel, Chicago, Ill.

12-14 Empire State Petroleum Assn., Hotel Syracuse, Syracuse, N.Y.

12-16 Society of Automotive Engineers (national tractor meeting), Schroeder Hotel, Milwaukee, Wis.

12-16 American Inst. of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

12-17 American Chemical Society, New York, N. Y.

13-14 Packaging Institute (petroleum packaging committee), Philadelphia, Pa.

15-17 National Petroleum Assn. (52nd annual meeting), Traymore Hotel, Atlantic City, N. J.

15-17 American Petroleum Institute Lubrication Committee, Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Assn. (annual meeting), Roosevelt Hotel, New Orleans, La.

22-23 Ohio Petroleum Marketers Association (fall conference and golf tournament), Hollenden Hotel and Westwood Country Club, Cleveland, Ohio.

23-24 Western Petroleum Refiners Assn. (regional meeting), Henning Hotel, Casper, Wyo.

26-28 Pennsylvania Petroleum Assn., Inc., Pocono Manor Inn, Pocono Manor, Penna.

27-28 Independent Oil Compounders Association (7th annual meeting), Sheraton Hotel, Chicago, Illinois.

OCTOBER, 1954

3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sheraton Park Hotel, Washington, D. C.

4-6 Texas Mid-Continent Oil and Gas Assn. (annual meeting), San Antonio, Texas.

4-6 Petroleum Electric Power Association (26th anniversary meeting), Jung Hotel, New Orleans, La.

4-9 Society of Automotive Engineers (national aeronautic meeting), aircraft engineering display, and aircraft production forum, Hotel Statler, Los Angeles, Calif.

7-8 American Institute of Mining and Metallurgical Engineers (Pacific Petroleum Chapter), Biltmore Hotel, Los Angeles, Calif.

10-12 National Assn. of Oil Equipment Jobbers (4th annual meeting), Congress Hotel, Chicago, Ill.

10-12 Empire State Petroleum Association, Whiteface Inn., Whiteface, N. Y.

12-15 National Chemical Exposition (8th meeting), Coliseum, Chicago, Ill.

13-15 National Industrial Conference Board (annual meeting on atomic energy), Hotel Commodore, New York, N. Y.

17-20 American Institute of Mining and Metallurgical Engineers (fall meeting, petroleum division), Plaza Hotel, San Antonio, Texas.

Week of
Oct. 18 Society of Automotive Engineers (national transportation meeting), Boston, Mass.

20-21 Nebraska Petroleum Marketers Assn. (annual convention), Paxton Hotel, Omaha, Neb.

21-22 Western Petroleum Refiners Assn. (Garrett Hotel), El Dorado, Ark.

24-26 Independent Petroleum Association of America, Mayo Hotel, Tulsa, Okla.

25-26 Independent Petroleum Assn. of America (annual meeting), Tulsa, Okla.

25-26 Independent Petroleum Assn. of America (annual meeting), Shamrock Hotel, Houston, Texas.

25-27 NLGI ANNUAL MEETING, MARK HOPKINS HOTEL, SAN FRANCISCO, CALIF.

25-29 American Institute of Electrical Engineers (fall general meeting), Chicago, Ill.

26-27 Society of Automotive Engineers, national diesel engine meeting, Hotel Statler, Cleveland, Ohio.

27-29 American Institute of Electrical Engineers (Conference for Petroleum Industry), Mayo Hotel, Tulsa, Okla.

27-30 American Society of Mechanical Engineers (annual engineering conference), Statler Hotel, Los Angeles, Calif.

28-29 American Petroleum Institute (Executive Committee of the Board of Directors), The Greenbriers, White Sulphur Springs, W. Va.

NOVEMBER, 1954

4-5 Society of Automotive Engineers (national fuels and lubricants meeting), Mayo Hotel, Tulsa, Okla.

8-11 American Petroleum Institute (34th annual meeting), Conrad Hilton Hotel and Palmer House, Chicago, Ill.

15-17 American Petroleum Credit Association (annual conference), Muehlebach Hotel, Kansas City, Mo.

15-17 American Standards Association (annual meeting), Roosevelt Hotel, New York, N. Y.

15-17 National Conference on Standards (5th conference), Roosevelt Hotel, New York, N. Y.

28 to Dec. 3 American Socy. of Mechanical Engineers, Statler Hotel, New York, N. Y.

29-30 Packaging Institute (Petroleum Packaging Committee), New York, N. Y.

DECEMBER, 1954

2-7 National Exposition of Power and Mechanical Engineering, Commercial Museum, Philadelphia, Penna.

3-4 Interstate Oil Compact Commission, Drake Hotel, Chicago, Ill.

5-8 American Society of Agricultural Engineers (winter meeting), Edgewater Beach Hotel, Chicago, Ill.

8-10 Oil Industry Information Committee, Waldorf-Astoria, New York, N. Y.

12-15 American Inst. of Chemical Engineers (annual meeting), Statler Hotel, New York, N. Y.

27-30 American Association for the Advancement of Science, University of California, Berkeley, Calif.

JANUARY, 1955

10-14 Society of Automotive Engineers (golden anniversary annual meeting), The Sheraton-Cadillac Hotel and Hotel Statler, Detroit, Michigan

FEBRUARY, 1955

13-18 ASTM Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston, Texas.

MARCH, 1955

15-17 Ohio Petroleum Marketers Association (spring convention and trade exposition), Deshler-Hilton Hotel, Columbus, Ohio.

MAY, 1955

23-25 American Petroleum Institute (Division of Marketing, mid-year meeting), Chase and Park Plaza Hotels, St. Louis, Mo.

JUNE, 1955

6-15 Fourth World Petroleum Congress, Rome, Italy.

NOVEMBER, 1955

14-17 American Petroleum Institute (35th annual meeting), San Francisco. Calif.

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Permagel-formulated greases get their "muscles" because Permagel is a highly colloidal inorganic mineral material, whose needle-like particles endow it with ideal thickening and strengthening properties.

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Q **Can I, as a manufacturer, promote the markets for lithium-bearing products?**

A Present shipments by Foote to industry exceed those in 1951 by several times, and the tonnage is steadily increasing. By year's end, Foote will be shipping still larger quantities so that early in '55 you can count on a steady flow to meet your needs. The answer to your question, then, is "Yes"—plan today with Foote, to be ready for the market tomorrow.

Q **Can I obtain Foote lithium compounds today for development purposes?**

A Yes, and in addition, the Foote Research and Development Laboratories will be glad to assist you in your program.

Q **Will a lithium development program pay off?**

A We need only cite the tremendous advances that have been made with lithium in the ceramic and lubricating grease industries—and the unique properties of lithium compounds have yet to be exploited fully even in these two large areas. Foote production in '55 gives you assurance that your program can proceed with full speed ahead.

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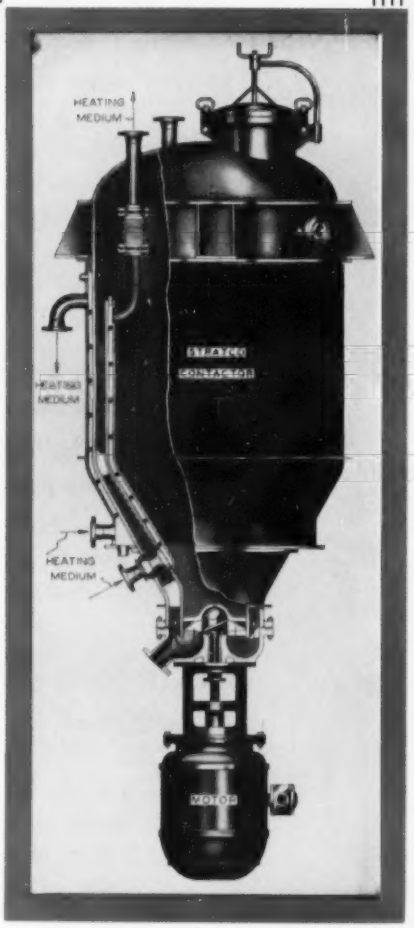

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